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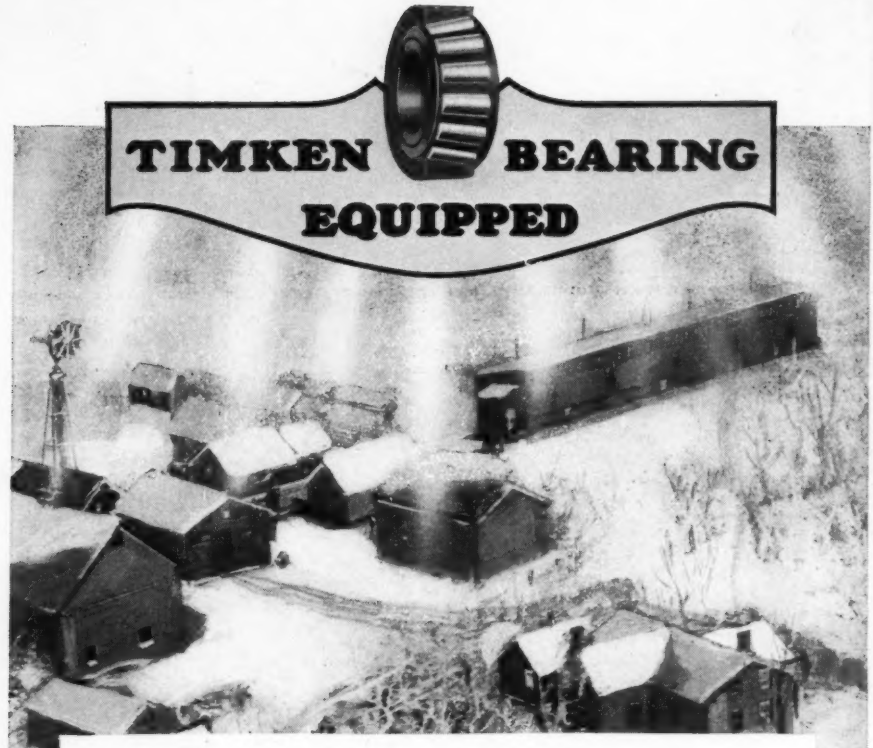

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R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

Editorial Offices: 19 West 44th Street New York

VOLUME XIV NUMBER ONE

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Agricultural and Scientific Bureau
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Directors: J. N. HARPER G. J. CALLISTER

WINTER COTTON

Better Crops with PLANT FOOD

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Make the Best Better, says Jeff in—

Defenders Wanted

By Jeff McDermid

WHETHER you are living on Main street or along the open road, whether you are pulling teeth or pulling weeds, there are two subjects which must surely interest you profoundly. They are Youth and Agriculture.

These are common denominators in the mathematics of mankind. Without the former we should hold slim hopes for humanity's gradual improvement, and without the latter there would be no dishes to wash and our lives would end.

By this I do not mean that the one pertains solely to providence and the other to provisions. Indeed no, for youth is more than a quick pulse and agriculture is more than a food foundry.

The main premise is that both are elemental in the physical, social, and spiritual degrees together, and that we are not considering them for what they mean materially alone.

'Tis true, my friends, some youngsters don't know this and many farmers won't admit it, but that need not deter us from stating the case to the jury.

In doing so I wish to draw a parallel between these two things to show how they have much in common, and that we who are neither young nor farmers have a duty and a privilege to perform in relation to both. Most of us have sat on the side-lines lately and let the weary old world wag its head at youth and agriculture without stopping to ask ourselves what we

knew personally about the question. We have taken our "pap" so long in pre-digested form that it is no wonder we have accepted anything as axioms.

Youth has been the subject of more poetry, good and bad, than anything else except romance itself. To choose any line from any of the millions of metrical tributes devoted to youth would be begging the question, but here is a tender writer of my fancy who gets a good start:

While the heart beats young! O, the splendor of the spring,
With all her dewy jewels on, is not so fair a thing!
Our bare feet in the meadows, and our fancies up among
The airy clouds of morning—while the heart beats young.

Lifting the harp of a Celtic bard, on the other hand, we find him and hundreds of others repeating the praise of agriculture in manifold measures. Singing of "life's sequestered scenes" this bonny bard unfolds the age-old message which romantic minds have flung forth repeatedly as the key-note of farming, thus:

Long may thy hardy sons of rustic toil
Be blest with health and peace and sweet content!
And, oh! may Heaven their simple lives prevent
From luxury's contagion, weak and vile!
Then, howe'er crowns and coronets be rent,
A virtuous populace may rise the while
And stand a wall of fire around their much loved Isle.

SO my first point is that youth and agriculture have been treated to much poetic license and had the incense of romance burned to cinders in their honer.

Ever since Adam was ejected from the Garden of Eden and began to lead a pastoral and a paternal life, while Eve did the cooking, we have faced the problem of youth and agriculture. It was simpler in Adam's day, perhaps, for he managed to use a crooked stick both for plowing and boy correcting —yet we recall that he had weeds in his onions and murder in his family.

The oldest books in the universe treat frequently on youth and husbandry. The eternal presence of youth and the basic need of victuals stirred the old dreamers to allegory and led the ancient philosophers to moralizing. Plato, Aristotle, and Confucius, David, writer of psalms, and Solomon, author of proverbs—each and all yield tidbits of wisdom concerning the progress of agriculture and the control of progeny.

Presumably, Solomon had so many sons that he required a special code for them, and we find him writing much after the modern fashion when he says: "A fool despiseth his father's instructions, but he that regardeth reproof is prudent. He that gathereth in summer is a wise son; but he that sleepeth in harvest is a son that causeth shame."

Agriculture was likewise a question mark of eternal proportions in the days of the patriarchs. It divided attention equally with child raising. In the same Book we may read many such passages as these:

"He destroyed their vines with hail, and their sycamore trees with frost. He gave up their cattle also to the hail, and their flocks to hot thunderbolts."

My second point in this parallel swings on this thought: that few groups of society have had so much unsolicited advice of a questionable kind as youth and agriculture.

This hunch comes from personal observation and from some reading in rather mellow volumes of a bygone era. Particularly noxious are such typical tomes as Horace Greeley's, What I Know About Agriculture, and Lindley Murray's Reader, de-

(*Turn to page* 62)

A firm, compact seedbed is one of the essentials of success with alfalfa.

Alfalfa *and* Sand

By B. O. Hagerman

Agricultural Agent, Pennsylvania Railroad, Grand Rapids, Michigan

THE Keystone Demonstration Farm, sponsored by the Pennsylvania Railroad and located on Plainfield sand just north of Howard City, Michigan, is studying alfalfa. It is said that there are between nine and eleven million acres of sandy soil in Michigan upon which many of the lessons about alfalfa that we have learned by experience might apply, either wholly or in part.

The purpose in maintaining this farm is to demonstrate that it is possible to operate these sandy soils so that such farms can become the background for good homes with enough left over to properly feed and clothe the children and send them to school.

This alfalfa was fertilized with 0-16-30.

What now has become known as the Keystone Rotation, our cropping program, was first devised by my brother, D. L. Hagerman, deceased, and has been carried on in much the same way as it was originally planned. It is called the "Keystone" rotation for two reasons; first — because the Keystone is the insig-

This plot was fertilized with 0-16-16.

nia of the Pennsylvania Railroad, and second — because the Keystone is the emblem of safety and stability.

To the farmer engaged in cropping the lighter types of soils, we believe that this rotation may be everything implied by the Keystone, as it constantly has considered the two greatest problems which face the operator of sandy soil, first—conservation of soil moisture, and second—building up soil fertility while at the same time making a living.

The means that are used to accomplish this are the growth of legumes—alfalfa and sweet clover—with crops of second growth sweet clover to turn under as green manure. Crops of vetch and rye are planted in the fall to hold the fertility from leaching during the late fall and early spring and to furnish additional green manure and as much nitrogen as possible to turn back to the soil. In the organization of the farm, the rye and vetch are cash crops, with potatoes and beans used occasionally. Oats, corn for silage, and the legumes furnish the feeding basis for our herd of pure-bred and grade Guernseys.

Naturally the backbone of our feeding ration is alfalfa hay and this story will deal with some facts that our experience has taught us about growing this legume.

All of this sand soil, which originally grew giant pine forests, was too acid to grow the legumes when first cleared. We recognized the futility of trying to make a profitable farm out of a soil that was too sour to grow legumes, and so our first step in order to prepare for alfalfa was to lime the field sometime previous to the year when we expected to sow alfalfa. Since there is a dry marl bed about a mile and three quarters from the farm, this was used as the most readily available source of soil neutralizer. With the exception of one attempt at hydrated lime, the fields on the Demonstration Farm have been marled at from four to five cubic yards per acre.

A Firm Seedbed

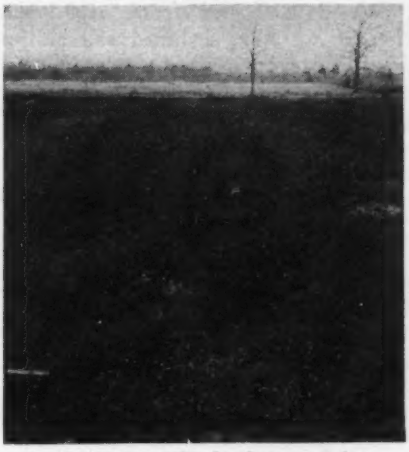
The next essential in alfalfa growing is a compact, firm seedbed. In many of my illustrated talks, I show an aeroplane just "taking off" and say that while an aeroplane is not necessary to the profitable management of a sandy farm, often the owner may need one to keep up with his farm during some of our high wind storms. In fact, the blowy nature of sandy soil, particularly after its humus has been cropped out, is one of the facts that must be calculated on beforehand.

This plot received 0-16-0.

I use the aeroplane picture to illustrate the principle of sand land when it starts to blow. Like the aeroplane, the sand particles start to move slowly at first, and as soon as a sufficient amount of energy called momentum is established, the particles "take off" into the air. Rolling sand land with a flat surface roller makes an ideal "aviation field" for the sand particles. But if this same sand land is rolled with a cultipacker or some other form of corrugated roller at right angles to the prevailing winds instead of having the flat smooth surface, there are instead a series of ridges and gullies which very materially retard the moving particles and greatly reduce the shifting of the soil. Also due to the mechanical construction of this type of roller, it packs the soil to a much greater depth, which also aids in conserving moisture.

In addition to packing the seedbed well previous to seeding, the final act after seeding is to again run the cultipacker over the fields at right angles to the prevailing winds. This aids in preventing wind damage after the alfalfa is up, as well as firming the soil around the small seed, insuring a much speedier germination.

The ability of the alfalfa plant to add nitrogen to the soil depends upon whether or not it has nodules on its roots. Alfalfa will eventually, if it lives that long, add nodules to its roots, but it is a slow process and one that we cannot afford to use, because artificial inoculation is so cheap and is accomplished so easily.



An 0-16-24 was the fertilizer used here.

This plot received 0-16-8.

Our experience with varieties of alfalfa to plant has convinced us that to resort to common alfalfa is a very dubious practice. It is true that common alfalfa occasionally under favorable conditions will come through with a good stand, but to avoid as many hazards as possible, we use only the more hardy varieties such as Hardigan, Grimm, or Ontario Variegated.

Worth the Expense

Getting an established stand of alfalfa ordinarily is expensive, but if successful the effort is well worth the expense. Under our system of management, our stands of alfalfa cost in the neighborhood of only about $11.65 per acre. The first year's hay crop usually pays the bill and we have the alfalfa left. It is because of these unwarranted hazards that would-be alfalfa farmers run that I write this story. Experience is the best teacher, to be sure, but we are wise if we do our learning from the other fellow's experience.

We have found from experience that if we have a limed soil and a good compact seedbed, we can sow our alfalfa with a spring sown crop of peas and oats and get a good stand if we have enough plant food of the right kind in the soil. This makes use of the spring moisture that falls, both to pack the ground and start the alfalfa. Taking the oats and peas off early as an emergency hay crop reduces the moisture hazard for the alfalfa, gives us a crop from the field that year, and lessens the actual cost of our alfalfa stand.

For some time, in our endeavor to build up the farm as an ordinary farmer would, we grew alfalfa with lime alone, but with not much success. Then later we tried using superphosphate alone. But the most interesting of our experiences up-to-date with the plant food requirements of alfalfa on our sandy soil is that it requires potash more than any other single element.

A recital of the four measured experiences that we have had will show how outstanding is the response of alfalfa to this plant food on sandy soil.

In the spring of 1928 we laid out five plots with check plots between. For convenience we will call these the North Plots as they are away at the north end of the farm. These five plots got a uniform application per acre of 525 pounds of 0-16-0, 0-16-8, 0-16-16, 0-16-24, and 0-16-30.

"POTASH PAYS!"

At the time of the Field Day on August 27, 1928, these strips treated with the last four mixtures, showed up much greener and much more vigorous than the others. However, there was a good stand on all of them including the check plots, and so we waited until the following spring to make any sweeping deductions. We did have some personal opinions and these opinions were such that since the remainder of the field had had no treatment, and the plants were showings signs of potash starvation, we decided to try another experiment. Consequently, in September the two words "POTASH PAYS" were sketched in letters 75 feet high and with a five-disk grain drill, the outlines were top-dressed with muriate of potash at the rate of 200 pounds per acre.

After the winter of 1928 and 1929 had cleared away, we found that the check plots and the strip that got superphosphate alone were much the worse for wear. There was very severe winter injury. It was only on the plots where more or less potash had been used that we had a profitable stand of alfalfa. The letters "Potash Pays," as well as the north plots showed very distinctly that potash was the limiting factor, especially in bringing alfalfa through the rigors of our winters. The letters showed up very distinctly; in fact, they made the rest of the field look so bad in comparison that we decided to top-dress the entire field with muriate of potash, which we did along the last of April at the rate of 200 pounds per acre.

The tool that we used for this was a two-wheeled lime sower, one end hole of which did not work well. This meant that every alternate round on the field, there was a considerable space not covered. At harvest time, these yellowish green serpentine lines were too apparent. They taught their own lesson.

Treatment	*Dry Weight Per Acre*	
Check (Average of the five check plots)	438.9 lbs.	***
525 lbs. 0-16-0	676.5 "	***
" " 0-16-8	1,025.0 "	**
" " 0-16-16	1,864.0 "	*
" " 0-16-24	1,765.5 "	*
" " 0-16-30	2,054.2 "	*

***—Very weedy, mostly mullens and June grass.
**—Some weeds.
*—Clean, clear hay.

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Left to right: (1) 400 lbs. muriate of potash; (2) 200 lbs. muriate of potash and 500 lbs. superphosphate; (3) 500 lbs. superphosphate; (4) check.

Getting "STRETCH"

By T. H. Blow

Springfield, Massachusetts

A. W. SAVAGE of Andover, Connecticut, has found out how to put the "stretch" into his alfalfa and at the same time get the long-lived stands which spell profit to the dairy farmer. The secret was potash. For every dollar invested in potash to feed his alfalfa, he received $3.93 in return. This was after all costs for harvesting and for fertilizer were deducted.

Mr. Savage had been able to get good catches of alfalfa on his farm, but they lacked the stretch necessary to give the tonnage which alfalfa has to give to make profits. After the first year the regularly spaced white spots which mean potash starvation would appear on the leaves. Then the leafhoppers would come in after the first crop and by sucking the juice from the plants would put the finishing touches on the stand. The alfalfa would die out rapidly and be replaced by grasses. This is a condition typical of too many alfalfa fields in New England.

In 1926 Mr. Sagave seeded alfalfa on a well-drained sandy loam which was limed liberally. The year before 14 tons of manure and 700 pounds of superphosphate per acre were used for corn so that the land was in supposedly good shape as regards fertility. In 1927 three one-tenth acre plots were used to demonstrate the value of superphosphate and potash as a top-dresser. Plot one received muriate of potash at the rate of 200 pounds per acre; plot 2, superphosphate at 500 pounds per acre; and plot 3 got the combination of potash and superphosphate at the same rates as in plots 1 and 2. The rest of the field served as an unfertilized check.

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GEORGIA

Experiment Station

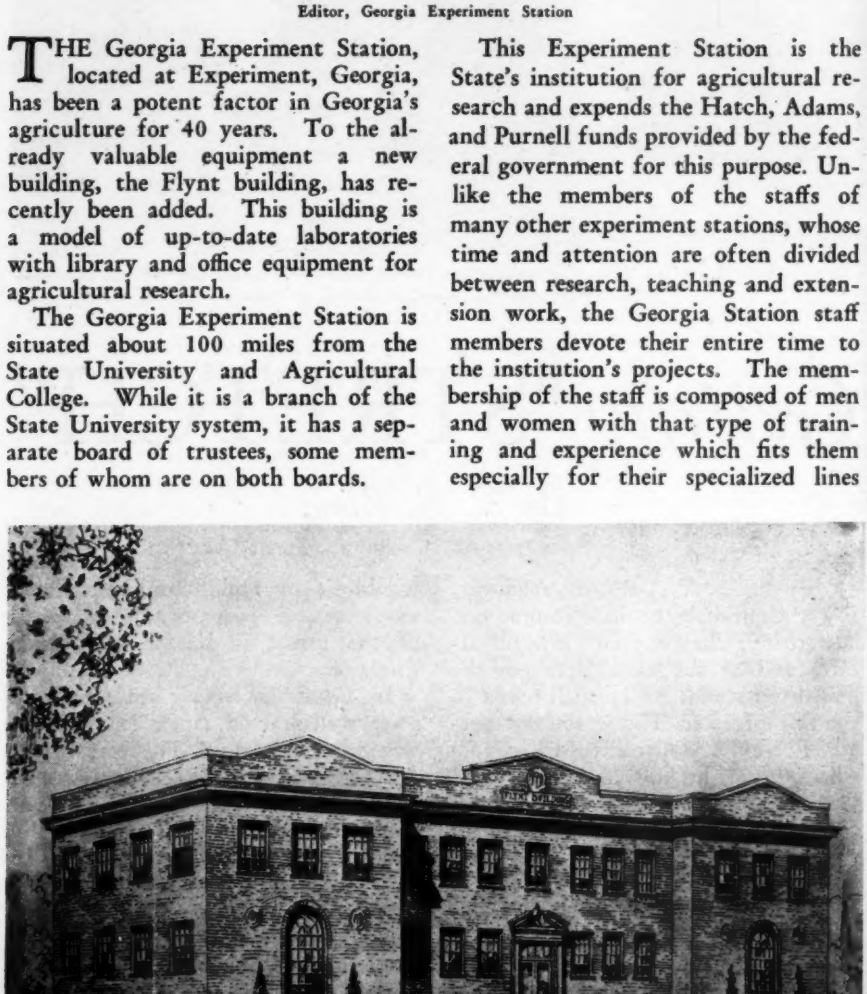
By C. A. Whittle

Editor, Georgia Experiment Station

THE Georgia Experiment Station, located at Experiment, Georgia, has been a potent factor in Georgia's agriculture for 40 years. To the already valuable equipment a new building, the Flynt building, has recently been added. This building is a model of up-to-date laboratories with library and office equipment for agricultural research.

The Georgia Experiment Station is situated about 100 miles from the State University and Agricultural College. While it is a branch of the State University system, it has a separate board of trustees, some members of whom are on both boards.

This Experiment Station is the State's institution for agricultural research and expends the Hatch, Adams, and Purnell funds provided by the federal government for this purpose. Unlike the members of the staffs of many other experiment stations, whose time and attention are often divided between research, teaching and extension work, the Georgia Station staff members devote their entire time to the institution's projects. The membership of the staff is composed of men and women with that type of training and experience which fits them especially for their specialized lines



The new headquarters of the Georgia Agricultural Experiment Station.

of research. Already a number of these investigators have reached that satisfying and distinguished position of being the best authority on certain particular lines of their endeavor.

Director H. P. Stuckey, who has served this institution for 20 years, has possibly done more to promote agricultural research than any other one individual in the State. A research worker of note himself, he has taken the lead in southern horticulture and has consistently directed the policies of the institution along definite lines of fundamental research. Two books, Pecan Growing and Horticulture, now used as textbooks in southern agricultural colleges and vocational schools, are the results of much of his work and authorship. Under his direction the Georgia Station has more than doubled its capacity for service to the State's agriculture and the results of its work are being put into practice in every part of the State.

H. P. Stuckey, Director, has served the Georgia Experiment Station for more than twenty years.

No attempt will be made here to detail the accomplishments of this research institution, but brief mention may be made of the fact that Georgia and other States have been saved vast sums of money through the discovery made at this station years ago of the fact that small grain seeded in the water furrow is practically insured against winter injury.

At this station some of the first comprehensive fertilizer experiments that proved of real value to farmers of Georgia were inaugurated.

In cooperation with the United States Department of Agriculture, the Georgia Station did the first work of importance on the fertilization of the peach in the South. This project covered not only the fertilizer responses of the peach, but also the effect of different fertilizers on the shipping quality of the fruit.

Formerly there were a number of commercial pear orchards in the South. They have been wiped out by blight. In studying this problem, the Georgia station developed the fact that a variety of pear which has been named "Pineapple pear" is resistant to the disease. Following this discovery, the State is making progress toward recovering its loss in pear production.

Here at the station a great deal of work has been done to improve the muscadine group of grapes, which includes the scuppernong variety, with crosses and selections. It was found that prepotent male vines gave desirable qualities to their offspring. One who visits the station will find clusters of muscadines growing on the vine where one muscadine grew before.

This station has taken a leading part in the study of plant diseases and in devising methods of combatting the diseases with immunity and sprays.

Turning from the past to what is now going on and is being achieved at the Georgia Experiment Station, we find that the agronomy department is developing a rustproof, high yielding strain of wheat from double crosses. A strain of high yielding oats also has been brought forward.

The former belief that plants absorb their nitrogen only in the form of nitrates has been disproved at the station where cotton plants have been provided with nitrogen in the form of ammonia and checked with plants provided with nitrogen in the form of nitrates. The outcome of the first year's study under carefully controlled condition shows that for the first two weeks the young cotton plants absorb nitrogen at the rate of 35 parts ammonia to 100 parts nitrates. A gradual change is noted until about 55 parts ammonia nitrogen to 100 parts nitrate is the ration when plants are six weeks old.

Studies are being made at the station as to the sources of nitrogen for cotton, nitrogen side-dressings, and rate of applying complete fertilizers, final results of which will soon be forthcoming.

In cooperation with the United States Department of Agriculture and the State College of Agriculture, a survey has been made of the length of staple of cotton grown in Georgia. Practically 80 per cent of the staple is 7/8 of an inch or shorter, whereas a demand exists for a staple an inch and more in length at a higher price.

A parallel cotton study is being made in the laboratories to determine the percentage of lint, length of staple, percentage of immature fiber, strength and drag, all of which are considered basic to correct cotton grading.

The station has expanded its study of soils and crops by establishing outlying fields of experimentation. With the development of this work eventually the station will have scientific data of practical value on the various leading soil types of the State.

At the Georgia Station the discovery was made that blossom-end rot of tomatoes is not an infectious disease and can be controlled by maintaining the proper degree of moisture in the soil. Valuable work also has been done in determining just how tomatoes resist the fusarium wilt. The control of the Sclerotium blight (sweet potato bed rot) in sweet potato beds by reducing the soil acidity and work on the stages of development and methods of control of several diseases of the pimiento pepper are accomplishments of the institution that are of economic value. A comparatively simple process of treating pimiento pepper seeds as they are removed from the fruit has a far-reaching influence on the suppression of certain seed-borne diseases.

The station is engaging many horticultural problems in which fertilizing and marketing peaches; varietal studies of pears; tests of different kinds of berries, muscadine grapes, onions, pecans, etc., are in progress.

The discovery that all commercial varieties of pecans can be divided into two distinct groups, and that one is largely dependent on the other for pollination, is an accomplishment of the Georgia Station. Further work on the flower and nut development of the pecan and the relation of weather and soil conditions to the summer drop bids fair to establish principles which can be employed in overcoming this trouble.

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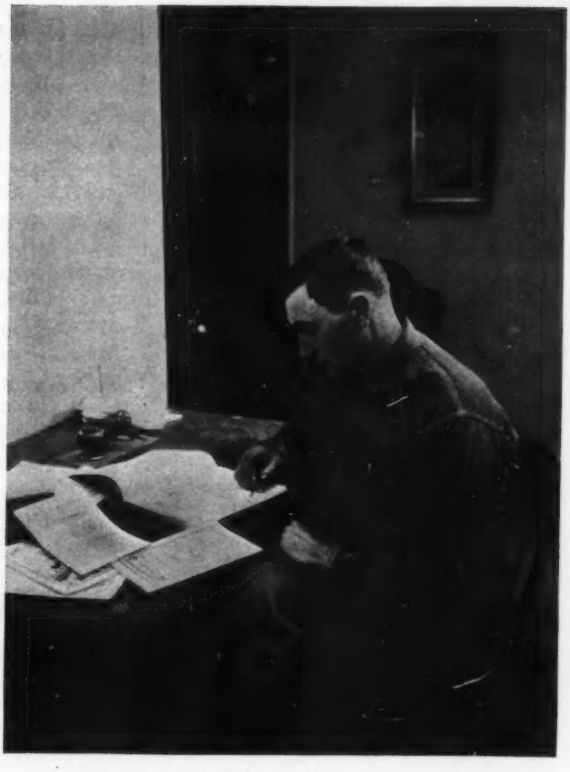
Time *to* Budget

By C. B. Sherman

Washington, D. C.

FARM budgeting is one of the newest lines of work that has been launched by the United States Bureau of Agricultural Economics to aid in preventing over- and under-production. The general idea of budgets is not new in agriculture, but it is only recently that concise and practical methods for making and using farm budgets have been worked out and made available to farmers and their advisors.



A practical farmer keeps his accounts up-to-date.

A farm budget comprises a plan for the use of land, man labor, horse work, equipment, and other farm resources, and a plan for the system of farming for the coming year, which is based on a carefully worked-out estimate of how well a particular combination of crops, or combination of crops and livestock, will pay. It shows the number of acres of the different crops, the number of head of the different kinds of livestock, the expected crop and livestock production, the expected feed requirements, expected cash expenses, and expected receipts for the system contemplated.

"The ups and downs in agricultural production are partly the result of changes made by farmers in acreages of crops and numbers of livestock," points out J. B. Hutson, who, in cooperation with State workers has developed this plan and put it to work. "Such changes are often necessary, but too often they are overdone in some lines and underdone in others. Decisions are often based upon the prices at or immediately before planting or breeding time and upon the crop yields and livestock production of the preceding season, rather than upon the prospects for the time when the products will be ready to sell. The adaptation and application of the bud-

get method, used in other business undertakings, is one way for farmers and their advisors to help to meet the situation, for this method uses carefully worked-out estimates as to yields, and prices that are likely to prevail at marketing time."

Individual farmers may, in many instances, need the aid of their farm advisors in drawing up their budget. In fact, this is the way the work has developed in Kentucky and North Dakota, where farm budget work has been tested. In each of these States a joint representative of the Bureau and the State College of Agriculture has used the budget method, for two years, when working out farm plans with individual farmers, in their follow-up and demonstration work that they based on previous research in farm management in those States. Regular routes among his farmers had been developed by the investigator.

Find Best System

The field man sits down with a farmer and works out a budget for a farm system similar to the one the farmer has been following. Then he suggests such changes as the records, experimental data, and the price situation indicate to be desirable and draws up a new budget for this changed system. Other changes may also be proposed and budgets may be worked out for these systems. All of these budgets are then compared and the system that seems to promise the best results and that is feasible under the individual circumstances and particular price sitution is chosen for use during the next year, and for as many years as existing conditions of labor, production, and marketing remain substantially the same. Kentucky, North Dakota, Kansas, Mississippi, North Carolina, Texas, and Virginia are some of the States in which organized projects are under way under which more or less farm budgeting work is done.

"The kinds of crop and livestock should usually remain the same for a period of years, but it is seldom possible or advisable to plan to grow the same acreage of each crop or keep the same number of each class of livestock each year," says Mr. Hutson. "If nothing else, variations in the number of livestock born, and crop failures of the previous year, will make this impossible in some cases and inadvisable in others. Then there are lines of production, like dairying or handling a breeding herd of beef cattle, that a farmer must grow into; they can not well be developed in a year. Furthermore, if a farmer or his advisor makes a study of the conditions that influence prices, he will usually be able to form more accurate judgments as to prices expected during the coming year, for at least some of the products, from those of the past year or from the average for a period of years. It follows that the plans for each year should be different, in at least some respects, from the plans for any other year.

"Then there are the changes in labor requirements that are brought about by new equipment, such as the combine, and the cotton sled, and changes in methods brought about by pests like the boll-weevil and the corn-borer. All such changes must be watched.

"Even after a plan for the coming year has been carefully decided upon adjustments in this plan may be advisable during the year. Less favorable production may be obtained in the case of some crops than was anticipated, and more favorable production may be obtained with other crops. Higher prices or lower prices may be obtained for some products than were anticipated.

"In cases in which the prices contemplated for the crops and livestock vary widely from year to year, or in which the information used as a basis for judgments as to prices is meager, it may be advisable to work out different budgets for the crops and livestock decided upon for the year, and to use different prices, each being based

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CHAMPIONS

By Charles D. Byrne

Editor, Oregon State Agricultural College

JUST about a year ago, a modest farm boy of 17 years crossed the Rockies from Harrisburg, Oregon, to capture the highest honors in the 4-H Club world, the Moses Club trophy. His name was Edgar Grimes.

A year has wrought some changes in the lad. The modesty, the perseverance, the thrift, the patience and the keen mind that won him the national honor are of course still evident; but a maturity of thought and a note of confidence gained through a year of club leadership and farm management have been added. The Edgar Grimes that entered Oregon State college as a freshman this fall is no longer a boy but a fine upstanding young man with a definite ambition and a will to realize it. Not that Edgar did not have the ambition a year ago—it was eight years ago at his first 4-H Club summer short course at State College that he determined to complete a four-year college course in agriculture. But the details of his ambition are well defined and a clear picture of his life work has been conceived in his own mind.

"After four years of college, I am going back on the farm," he said in a tone that rang with conviction. And his eyes brightened and some of the modest shyness disappeared as he told of his past year's work.

"I had to stay out of school a year to finish some of the club projects I had started. You see I have always been strong on livestock work but I

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Edgar Grimes, national club champion 1928; Dean A. B. Cordley, Oregon State College; Alex Cruickshank, national club champion 1927.

Doctor Cordley of Oregon State College, one of the veteran deans of agriculture of the United States, is proudly displaying his two national champion 4-H club boys, both Oregonians. Edgar just entered college and is shown with his little green cap. Alex is a senior. It may be a long time before two national club champions in successive years are again enrolled in agriculture in the same school.

This crop of wheat was grown on land kept in a high state of fertility.

Keeping STEP

¶ *Agriculture must recognize "Efficiency and Quality" as the watchwords of the day.*

EVERY progressive farmer and every business establishment that serves agriculture, recognizes it to be a fundamental industry worthy of a much greater prosperity than it now enjoys. In recent years when one or the other of our major staple crops equals or exceeds the normal demand, returns to the growers become exceptionally unsatisfactory. In order to prevent thirty million producers from growing a surplus of a hundred or more commodities, or to create means of absorbing surplus production and yet not encourage re-occurrences of the condition, various types of agricultural relief have been proposed.

Through federal aid also, farmers have been encouraged to cooperate in the marketing of their products with a view to thus providing for them a greater return for their labors by minimizing the spread between price per unit received by the grower and the price paid by consumers. In the marketing of certain farm products, where the regular machinery for this purpose was not wholly efficient and where too much was not expected from cooperatively managed marketing organizations, they have proved more or less beneficial. However, it seems that too little recognition has been given to the fact that agriculture

A sickly crop resulted where the fertility of the soil had not been maintained.

with PROGRESS

By C. A. Le Clair

St. Louis, Missouri

has developed into its present position rather naturally and that to a considerable extent, farmers are responsible for the situation in which they now find themselves.

Farming, as it is done today, has evolved greatly since the pioneer agricultural days of the nation. Furthermore, in all probability, it is destined to continue to change in the years ahead. Originally, when lands were first farmed in this country, practically everything required by the family was produced on the place except medicines and dishes. The materials for constructing buildings and even much of cloth for clothing was homemade. A prosperous farmer in those days was, therefore, less dependent upon markets for cash to purchase a few special necessities.

As the frame or brick dwelling replaced the log cabin and a concrete highway took the place of the corduroy road, the same land that supported kerosene lamps and the horse and buggy, was expected to provide telephones, radios, electric lights, and automobiles. Instinctively, farmers found themselves striving to produce more bushels of grain, tons of hay, and pounds of milk for sale in order to get the funds to meet a new standard of living and correspondingly high

taxes. As a result the per capita production of American farmers increased tremendously. This increased production per farmer was accomplished largely through the use of machinery and improved cultural methods.

Seeking a Balance

Ultimately, and especially of late years, our agricultural production began to somewhat exceed the normal demand. Originally 95 per cent of the population of this country was engaged in agriculture and the problem of surplus production was then unknown. Today 30 per cent of the nation's population is feeding itself as well as the remaining 70 per cent, and instead of rejoicing in seasons of bounteous harvest, to get a good crop is now considered almost a calamity.

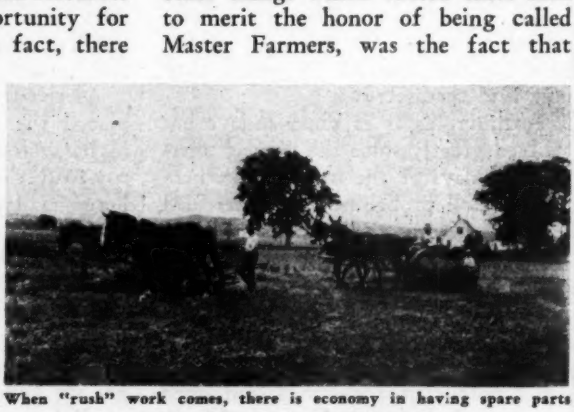
However, most of the economists in the country believe that the pendulum has swung about as far as it will go with regard to the prevailing unfavorable agricultural conditions. They point out that the number of people now leaving the farm for cities is just about being balanced by the drift back to the farm from the cities, while our consuming urban population is steadily increasing.

On the other hand, they claim the per capita production of our farmers so far as the use of machinery can be of assistance to this end has practically reached its limits. Further it is apparent that our arable land resources offer rather limited opportunity for further development. In fact, there are already under way economic surveys which are designed to be the basis for permanently eliminating millions of acres of marginal lands from the possibility of inefficiently contributing to staple crop production in the future. Already lands unadapted to general farming are being restricted in some States to reforestation or grazing purposes.

Hence, everything considered, the problem of surplus production from this time forward promises to be less acute. This is considering the future outlook from the long viewpoint. However, with the experience of wheat, potato, and cotton growers fresh in the mind, farmers naturally are especially concerned about how to better assure their profits in 1930.

In this connection it should be realized that more under the control of the grower than any other thing, is his cost of production. Therefore, via the avenue of reduced production costs, will farmers now and hereafter most surely increase their returns. No business in this day of keen competition can count on a profit and get it by adding what is desired to any cost of production that may be obtained. This principle applies to the business of farming equally as in any other industry. In other words, farming, if it is to be more profitable today and tomorrow, must base its plans on sound economics.

I had the pleasure of attending recently, a dinner at which seven Missouri farmers were awarded the distinction of being Master Farmers. These men operated average sized farms and their individual specialties included the production of livestock, poultry, grain, and fruit. Among other things which caused these men to merit the honor of being called Master Farmers, was the fact that



When "rush" work comes, there is economy in having spare parts at hand for repair of equipment.

Big yields of high quality crops reduce production costs and increase the grower's returns.

each and every one of them was making money. Their net incomes varied from four to five figures for a year's work. All of them had bought and paid for their farms with money made while cultivating the land. One of them, the son of a minister, explained that when he started out to farm he was entirely devoid of the handicap of any financial assistance. As these men related their experiences, and how they had attained success, one could not help but be impressed with the simple fundamental reasons to which they gave credit for having succeeded. For example, all of them had helpful wives. They kept up with the latest farm practices. Every one of them maintained the fertility of his land beyond its original ability to yield. They employed nothing particularly startling or revolutionary in the way of equipment. In fact, it seemed that these successful farmers simply applied sound business principles to their operations.

Instead of blaming Wall Street for every farm problem, these men applied the same business principles which industry has found profitable with corresponding results on their own crossroads or main street.

Let's consider some of the principles which business men have found it pays to follow and which could, without doubt, be applied by farmers more generally. To begin with, industry prepares for every emergency in the way of providing ample equipment. A well-conducted business establishment usually keeps in stock a duplicate of every tool or machine part necessary to keep the wheels of its production plants continuously turning.

How can a farmer who wants to be assured of better returns for his labors, parallel this feature of industry's efficiency? By making up his mind this spring—today—that he will tune up the mower before haying time—see to it that enough extra guards are available in the tool shed to meet any ordinary emergency. If this precaution is taken with regard to the farmer's entire equipment, unnecessary and costly planting, cultivating, or harvesting delay can be avoided without adding a nickel to the ultimate cost of production.

Business protects its investments with adequate insurance. Contractors increase their insurance coverage as a structure grows. Farmers, on the other hand, rarely insure their buildings for more than the structure is worth to say nothing of its contents. Yet a

mow full of new mown hay may represent the fruits and profits of the whole year and hence should be adequately insured.

Industry doesn't put its eggs all in one basket. Farmers should emulate this sound principle by practicing a wider diversification of crop and animal husbandry. To grow a rotation of corn, oats, wheat, and clover constitutes a good general cropping system to be sure, but it is capable of improvement. If, for example, in addition to the major staple crops a few acres of soybeans or barley are sown each spring, not only a greater variety of grain feeds will be available but protection against unfavorable growing conditions for any one crop is avoided.

Business keeps in repair its producing equipment and provides that its raw material supply is sufficient at all times. Everybody knows that as long as virgin lands were available, farmers of this country left depleted lands for new fields to deplete. Then the time came when no more new land in zones of adequate rainfall remained. Since then intensified cropping has continued and only the exceptional farmer has followed a system of adequate replacement of the fertility removed from the land by weather and crops.

Is it any wonder, therefore, that inferior wheat is today being delivered to the mills of this country? Is it surprising to have elevator men in the corn belt say that they can hardly buy number one corn any more? But this is not all! If our dairy cows could talk, many of them would order a six-foot mower attachment for their muzzles in order to be able to get enough grass of the kind that grows in the average pasture to fill the milk bucket.

We've got better seed today and more productive strains than ever before. The weather bureau tells us that there is no change in climate. Where then rests the difficulty in producing quality stuff? It is to be found in the insufficiency of our crop producing power plant—the soil. A few farmers who buy a great deal of feed have been able to maintain and increase the fertility of their acres but that is the slow and expensive way. Within the means of every farmer, there is a service they can afford to employ, which will stretch the size of their income without the need of moving their farm fences. This service is rendered by the commercial fertilizer industry. It gathers from the ends of the earth various plant food elements and makes these available in convenient form. The cost of commercial fertilizer fades to nothing when compared with the returns forthcoming in 90 days from the time an investment is made in them.

The Economy of Fertilization

Years ago, it was considered economical for farmers to grow legumes to gather fertilizer from the air. Today, it pays to raise these same crops for the feed they produce and the physical benefit they afford the land, but it is now more economical to buy nitrogen in a fertilizer sack.

Commercial fertilizers of the right kind, if properly used, are necessary not only to make thin land productive, but also to make the best land that lays out-of-doors yield bigger and better crops at a minimum expense to the grower.

Five dollars and a half to the acre invested in the proper fertilizer will hasten the maturity of corn from 10 to 20 days. It will yield one-fourth to one-half more and better quality grain. However, farmers should not let the eye be the judge when measuring their fertilizer profits. The crop from the fertilized ground and the rest of the field should be put over a scale. It takes better than one-fifth more corn to the acre to be measured by the eye and less than such an in-

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Question-box Meetings

By P. H. Stewart

Extension Agronomist, Nebraska Agricultural College

AGRONOMY extension workers in Nebraska are taking their cue from up-to-date authorities on pedagogy in carrying on a series of crops and soil meetings among farmers of the State. These events, called "Question-box" meetings for lack of a better name, are popular and after three years' trial seem to get better results than the ordinary meeting where the speaker attempts to do most of the talking with time allowed perhaps for a few questions.

Suppose that a meeting on legume crops is to be held in a community at which time the clovers and alfalfa are to be discussed as well as soil-building problems. Sometime before the meeting the Agronomy specialist and county agent should work out a set of questions which would serve as a foundation for the discussion. For instance, such questions as these might be prepared and a copy provided for each person at the meeting.

1. What is the best method of seeding alfalfa in this county?
2. Should we grow Grimm, Cossack, or northern common alfalfa?
3. Is yellow blossom sweet clover superior to the white blossom?
4. What are the main points to watch in seeding sweet clover?
5. What is the best way to build up run-down soils?
6. What commercial fertilizers can we profitably use on our local soil types?
7. What crop or crops follow alfalfa best?
8. Should this county grow a greater acreage of legume crops?

This list of questions may not seem long enough to make an entire pro-

An alfalfa field trip was organized to study winter-killing, alfalfa wilt, and varieties.

gram for a meeting. The chances are, however, that it is too long and, in a real live meeting, if the chairman knows how to start discussion and how to summarize the ideas, there will not be time for more than six or seven well-selected questions. More than one two-hour discussion has been held on six questions at Nebraska meetings and then folks were not talked out.

Experience has shown that there are several things to keep in mind in arranging for and in conducting question-box meetings. In the first place not all subject matter lines can be handled advantageously at this type of a meeting. The audience must have had some experience with the problems to be discussed. Obviously then, one cannot use this type of a meeting to present a subject matter phase which is entirely new and about which the audience knows little.

Discussions Should Be Lively

The ideal chairman for a question-box meeting is a fellow who can get folks in the audience to talk and yet hold a tight rein on the man who is too free with his comments, a part of which may be irrelevant. Usually the announcement that all talks will be limited to three minutes and that the speakers should stand up and speak so all can hear will add to the success of the meeting. Discussion on each point should not lag. Before moving on to a new question the chairman should summarize the ideas and develop if he can the fundamental principles underlying the practice or recommendation. A wide knowledge of farm practice and of experimental work will aid in doing this effectively.

There are several reasons why the question-box type of meeting is a particularly good one to use on many crop and soils problems.

In the first place it is human nature, possibly we should say human psychology, to enjoy taking part in events. The farmer who goes to a meeting only to hear a more or less cut and dried lecture is not likely to feel as satisfied as the fellow who has an opportunity to take the floor for a few minutes to tell of his own experiences or observations. If he talks or asks questions, it becomes his meeting and not the county agent's or specialist's. The conclusions are his and the suggestions being his, or at least being influenced by his remarks, are more likely to lead to action. And after all, the real purpose of our meetings is to get folks to adopt the recommended practices.

There are other advantages in the question-box meeting in addition to the increased interest and freedom of expression by all who have something to say. Have you ever gone to a meeting and listened for an hour to a speaker talk all around a subject yet not touch on the local phases in which the community was interested and about which they wished to hear? Yet the speaker, perhaps not knowing local conditions, missed the local point of interest or the local problems. If the farmers at a meeting take the floor for a part of the time, local problems and local practices are sure to be developed.

It is the exceptional agronomist, if he exists at all, who knows his State so well that he is able to answer all questions definitely for certain local conditions. Perhaps it is a sort of "buck passing" to have good successful farmers bring out the local practices that are most likely to succeed but nevertheless it is a safe and sound thing to do and the chairman who evaluates and recognizes local practices gains the respect of his audience. And should the meeting happen to be in a new or perhaps unusual part of the State so far as soil, climate, or latitude is concerned, the chairman himself may learn much from a question-box meeting.

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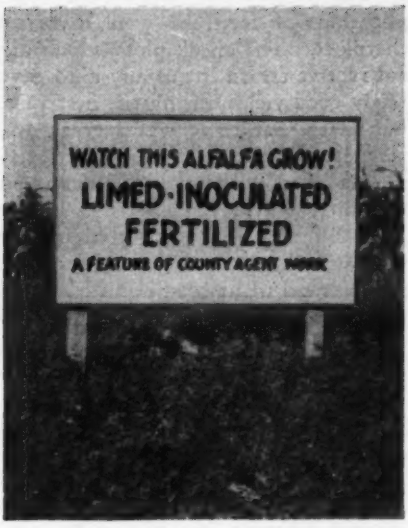
The Defeat *of* OLD MAN Winter



By Jerome J. Henry

Wisconsin College of Agriculture

WHEN alfalfa stands come out of the winter and spring up thickly and vigorously, there's a reason for the luxurious growth. Consequently, last spring when beautiful stands of alfalfa and clover practically covered the State of Wisconsin, investigators at the College of Agriculture, Madison, looked for the real reason which caused the surprising success of seedings, seedings which were unsurpassed by any that had been known in the State for a period of 21 years.

And these agronomists concluded that the reason summarizes itself into two main fundamentals—a good heavy coat of snow throughout the cold months to protect the stands, and a plentiful supply of plant foods available for plant growth.

The specialists at the Wisconsin College of Agriculture at once became anxious to have the great crop of legumes during the best year become an example of what can be accomplished with the clovers and alfalfa. L. F. Graber, agronomist, who has become known throughout the State as "Alfalfa" Graber, says that, although we cannot expect such a favorable season again for many years, we can do a great deal to assure equally successful crops by making other controllable conditions favorable to offset the rigors of dangerous winters.

Of the two fundamental reasons for the success of the great 1929 crop in the Badger State, one is controllable. Weather, of course, is beyond the control of crop producers, so they must resort to giving the alfalfa or clover crop the most favorable soil conditions possible. It is fortunate that when a sufficient amount of plant foods is available in the soil, winterkilling is much less apt to occur.

This has been shown in extensive fertilizer trials conducted at a branch station of the Wisconsin College of Agriculture at Hancock, Wisconsin, and also at the Georgia State College of Agriculture, Athens. A. R. Albert, soil specialist located at Hancock, sowed 30 plots of a standard alfalfa variety at the rate of 15 pounds per acre. The soil had been limed and continued to give a sweet reaction for a number of years following.

Surprising results ensued when ap-

plications of fertilizer were made on the plots. The check plots which did not receive treatment of any kind gave fairly good yields during the first year, but after that there was a great difference, and the third year practically nothing had withstood the winter on the untreated plots.

A different story was told on the plots which received treatments with the essential plant food elements. Even though some winter-killing took place where plots had been treated, it was often negligible and the result was always very favorable.

Several different combinations of fertilizers were employed in these trials. One was barnyard manure alone, and the others, various commercial mixtures in addition to manure. Superphosphate, potash, raw rock phosphate, and limate were all tried alone and in various combinations.

Studies of the total yield over a three-year period indicated that the yields of alfalfa generally followed the potash treatment. As potash applications increased, the yield increased. Applications above 300 pounds per acre of muriate of potash did not, however, increase the yield sufficiently to justify the cost.

In these experiments on sandy soils, potash seems to have been the backbone of the crop. More than any other fertilizer or combinations of fertilizers potash added stamina to the alfalfa and prevented winter-killing. The potash plots showed a minimum of winter-killing in comparison with the other plots.

On the sandy soils typical of the section where the experiments were run, it was discovered that applications of phosphates alone did not pay, but where phosphates were supplemented with potash or farm manure, the yield was increased sufficiently to be profitable. Potash supplementing phosphates gave better results than potash supplementing barnyard manure.

Deductions from these extensive trials led the experimenters to recommend applications of 300 pounds of muriate of potash and the same amount of 20 per cent superphosphate per acre. The potash applications may be reduced somewhat if barnyard manure is also applied.

Potash was also found to be the limiting factor in the production of all crops at the Coddington branch experiment station of the University of Wisconsin. The soil there is low and of a peaty nature.

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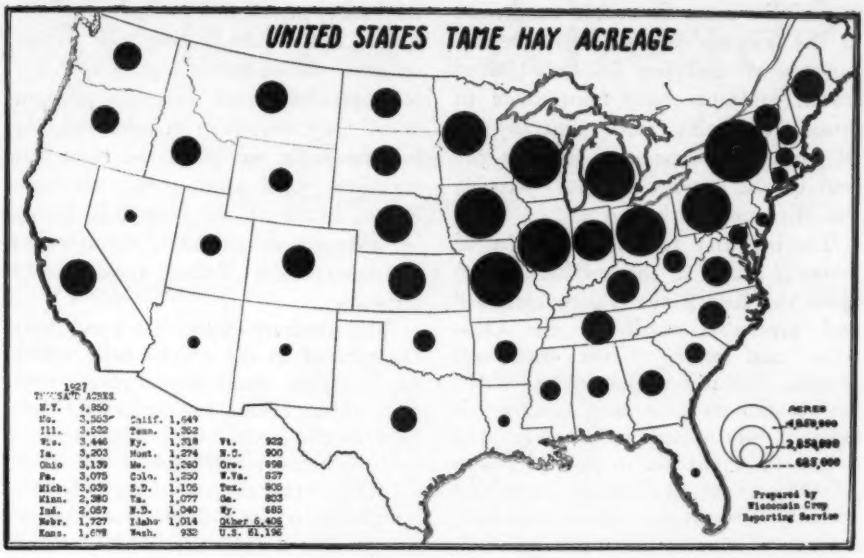
On sandy soils well treated with the necessary plant food elements, stands of alfalfa like this will come through a severe winter.



Tame Hay

¶ *Fourteenth in this series*

By Walter H. Ebling

Agricultural Statistician, Wisconsin

IN farm value, tame hay ranks third among the crops of the United States. It is exceeded only by corn and cotton. According to the 1929 estimates, the value of the entire United States hay crop is $1,349,000,000, and over 90 per cent of it is made up of tame hay.

This is within $77,000,000 of the total value of cotton and cotton seed; and corn, our most valuable farm crop, exceeds it by only about 50 per cent. The farm value of our hay is about three-fourths greater than the total farm value of all the wheat produced in the nation. In spite of the fact that the automobile and the tractor have displaced much animal power, the hay crop seems nevertheless to hold its important place in our agriculture.

A number of different kinds of hay are grown, and they are probably the most widely distributed of all farm crops in the country. Hay takes about 15 per cent of the crop acreage in the country as a whole. The wide differences between different sections of the country are usually due to geographic differences in the regions and to the type of agriculture which prevails. In the western United States there is less hay grown proportionately than in the East, there being less arable land. Much of the country is also relatively dry so that most of the tame hay crops do not grow well.

Alfalfa is an important hay crop throughout the West. This crop grows best on soil that is not acid and it seems to prefer regions of moderate rainfall. In the United States

it finds its most favorable conditions in the western States. With the expansion of dairying in the United States, attempts have been made to introduce alfalfa more generally in all parts of the country, but 83 per cent of the acreage was still west of the Mississippi River in 1927.

The best hay region of the United States is found in the northern States from the Red River Valley eastward and generally north of the Ohio River and north of the corn belt proper. In this region, as a whole, hay is the most important crop; it exceeds all others in acreage and value. The climate in these States is relatively cool and accordingly less corn is produced than in the corn belt. In general the region is favorable to dairying and with its early summer rains and somewhat drier late summers it is also favorable to the growth and curing of hay crops. The soils in the main are better suited to the production of hay than to some of the other cultivated crops. Much of the land in this region is rolling and the cultivation of other crops is more difficult than the production of hay.

Crop Is Widely Distributed

In addition these northern States have the largest portion of the United States population and for that reason have a large requirement for milk. Because of its weight, market milk is usually not shipped great distances and for its production much hay is required. Hay also, because of its bulk and high rate freight requirements in proportion to its value, is not usually shipped great distances. Accordingly, the dairyman who produces milk for the local market finds it to his advantage to produce more hay and ship in grains when additional feed is required.

In the central group of States, hay ranks second, corn being first. The conditions here favor the production of more corn, but on the other hand the corn belt supports a very large livestock population which also requires much hay during the winter months. Since the inshipment of hay is expensive, most farmers produce what they require. In addition, the hay crops fit well into the corn belt rotations and like the northern States, much of the corn belt hay is of clover and timothy, though the northern Ohio Valley raises much timothy.

The southern States are commonly thought of as the cotton belt, which has a rather small hay acreage, corn and cotton taking up the largest portion of the crop land. Since cotton and corn form the basis of the agriculture in this region which is largely dependent on cash crops, the production of hay is generally less important. The livestock population, especially beef and dairy cattle, is small in this area and the percentage of farm tenancy is high. Usually, also, the farms are small and the operations are not sufficiently extensive to make possible the keeping of much livestock.

Another difficulty in hay production in the southern States is the fact that the northern grasses and clovers do not thrive especially well in the climate of this region and satisfactory substitute plants are not available. The large amount of summer rain also makes the curing of hay difficult in this region. The map showing the tame hay distribution for the United States brings out rather well the concentration of hay in the northern and northeastern States and the relative sparseness of it in the southern and western States. Since wild hay is not included, some allowance must be made for this crop in the Great Plains States.

In addition to the widespread importance of the hay crop, the production of hay seeds constitutes an additional item which should probably be credited to the hay crop. Clover seed is an important crop in a group of States lying east of the Mississippi

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What's Ahead?

"The optimist the doughnut sees,
The pessimist the hole."

¶ Number Three

By Frank George

A FEW men now living can recall the great public concern over the first billion bushel corn crop in the United States. That was in the year 1870. What could be done with such a large production? American farmers answered that question by increasing production to two billion bushels in the next 20 years. By 1910, corn acreage crossed the one hundred million mark, and the industry was close upon a three billion bushel schedule.

With equipment like this, a silo can be filled at the rate of 20 tons per hour.

For the last 25 years, the corn crop has fluctuated between two and one-half billion and three billion bushels, and in the last 20 years acreage has remained practically stationary at around one hundred million acres. Acreage and production have been held in leash the last 10 years in readjustment to post-war economic conditions, but the economists are agreed now that the industry is on a well-balanced supply and demand basis. Where do we go from here! Will a three billion bushel corn crop be sufficient to help produce the livestock products needed by a domestic population of one hundred and fifty million people by the year 1950?

The increasing use of machinery and the increase in the size of farms have been outstanding developments in the Corn Belt in recent years. Tracts of 160 acres are now regarded as small farms. There are innumerable instances where farmers have taken on an extra "eighty" of a quarter section in order to secure the economies of machine farming. The 650-acre tract is being regarded more favorably as a family size farm, and it is pointed out that for maximum efficiency, units of 1,000 to 2,500 acres are needed.

Livestock and dairy farms of 600 acres will be as common in the great American Corn Belt 20 years from now as are 300-acre farms today. These farms will be fully mechanized. They will be equipped with tractors, four-row planters and cultivators, corn pickers and corn shellers, corn binders and silo fillers. They will

produce at low cost and sell at low cost in a domestic market which will have been increased by approximately thirty millions of consumers. The sale of corn-stalks and other residue for use in the manufacture of by-products will form no inconsiderable part of the farm income.

The American corn industry, like the wheat industry, has had a commercial history of less than 100 years. Corn growers 100 years ago were still using the wooden plows of their ancestors. A cast iron plow had been invented in the year 1797, but farmers would not use it because they said that cast iron poisoned the soil and ruined the crops. Farmers in New England were using fish to fertilize their corn fields, because experience had shown that by dropping a fish or two into each hill, yields could be secured three times the size of crops on ground not fertilized.

The method of using a fish for fertilizer was to dig small holes in the ground about four feet apart, put in a fish or two, drop in four or six kernels of corn, and cover them with a mattock or grub-hoe. According to an early chronicle of the Pilgrims "we manured our ground with herrings, or rather shads, which we have in great abundance and take with great ease at our doors. You may see in one township 100 acres together set with these fish, every acre taking 1,000 of them; and an acre thus dressed will produce and yield so much corn as three acres without fish."

Development Was Rapid

It had taken 200 years for farmers to abandon their wooden plows, but the gradual extension of settlements westward after the year 1825 when the Erie Canal was opened, and the planting of larger areas, forced men to lighten their labors, and by 1836 two factories in Pittsburgh were making 34,000 metal plows a year. Rapid improvements followed in the manufacture of harrows, cultivators, the horse-hoe, the grubber, drills, and

It is possible to cultivate from 40 to 60 acres of corn in a day with a tractor and a 4-row cultivator.

An ensilage harvester converts standing corn to ensilage in one operation. This new method leaves the field clean and delivers high-quality ensilage to the silo.

seed-sowers. The Patent Office was deluged with applications for patents on new farming equipment that would increase production per man.

Public men were amazed at this development in machine farming. Some of them said that it would result in an over-production of crops that would bankrupt the country's agriculture. Others declared that there was no need to worry on this account because men would soon exhaust their inventive genius. Charles L. Flint, writing in a United States Department of Agriculture report in 1872, declared that "a better knowledge of the strength of materials has enabled us to reduce the size of all the parts of farming tools, and so to avoid the clumsiness of the older style of implements, and, at the same time, to secure much more effective work.

"We have made some progress in the application of steam to the operation of plowing, and the wonderful performances of the steam-plow in the few instances where it has been tried, have indicated the possibilities of the future, and shown that the time is not far distant when we shall have it in our power to develop the resources of the great West to an extent and with an economy never yet imagined.

"The corn-sheller," he said, "has been brought to such perfection as to separate the corn from the ear with great rapidity, and with the application of little power. It has been adapted to horse-power also, and to different sections of the country, where different varieties of corn are raised, and to shell one or two ears at the same time. Its economy of time and labor is such as, upon large farms where the product is large, to pay for itself in a single year.

"As evidence that the mechanical genius of the country is not yet exhausted, but is as untiring as ever, it may be stated that the patents issued for improvements in agricultural implements and machinery for the year

1872 exceeded 1,000, of which 36 were for rakes, 160 for hay and grain harvesters and attachments, 177 for seed planters and drills, 30 for hay and straw cutters, 80 for cultivators, 73 for bee-hives, 90 for churns, 160 for plows and attachments."

There has scarcely been a time in American history when there has not been complaint of over-production in the corn industry. Nearly 300 years ago, in the Virginia Colony, corn production became so abundant that agents were sent to New England, Nova Scotia, the West Indies, and the Dutch settlements, to offer corn at 25 shillings a barrel, delivered. Hogs multiplied so rapidly that they were allowed to run at large, and many of them reverted to a half wild state. They became more plentiful than deer. By the end of the seventeenth century, hogs had become so numerous that it was generally impossible to tell how many belonged to a given owner. Shoats sold for four shillings apiece, and sows and barrows for eight shillings.

The Birth of Experiment Stations

Agricultural expansion on practically free lands was so rapid for more than 50 years following the opening of the Erie Canal that public men became alarmed at the approaching exhaustion of the supply of arable land in the public domain. Agitation was begun for a more intensive agriculture. This culminated in the Hatch Act in the year 1887, and the nation was launched on a program of growing two blades where one grew before. Twenty-six experiment stations were established in 1888, in addition to the 20 stations already in existence. The practical exhaustion of the supply of free land resulted in rapidly increasing farm land values in the Middle West, and this in turn forced farmers to seek larger yields per acre and to increase efficiency per man by the use of improved machinery. The greater power needed to pull the heavy machines was supplied at first by big teams; more recently, by tractors.

The United States always has been on a basis of relatively cheap food, and is likely to be on that basis for many years to come. Farmers have realized that in order to secure satisfactory returns for their work they must cut production costs to the bone. Costs have been kept down or reduced by efficient farmers, by the use of high yielding varieties, seed testing, and the right choice of equipment and sizes of teams. The two-row cultivator in the Corn Belt, for example, has been found to save about three-quarters of an hour of man labor per acre each time the corn is cultivated. The saving in man and horse labor on three cultivations amounts to about 70 cents per acre.

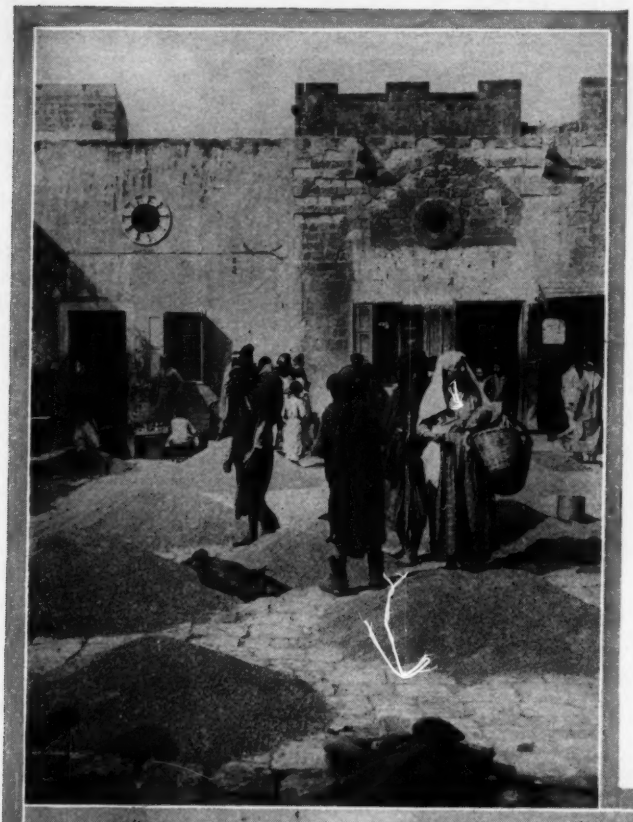
Farms with the lowest corn cost, however, do not always have the least labor per acre. Frequently the low cost is obtained by getting higher yields as a result of doing the needed work at just the right time, and through proper soil treatment, strain and virility of seed corn. It has been demonstrated that with a high grade tractor of 12 to 15 drawbar horsepower, a corn grower can prepare his land for planting at a rate practically twice as fast as with efficient team methods. One man with a two-horse team and riding cultivator can cover 8 to 10 acres a day. With a tractor and four-row cultivator he can cover 60 to 65 acres a day.

The horse-drawn picker was introduced 20 years ago, but the number sold during the last five years is almost double the previous rate of adoption. Its use is facilitated by the tractor, and it is estimated that approximately 40,000 mechanical corn pickers are now on farms. Most of the machines are of the one-row type, but two-row pickers are being introduced. The manufacturers of a newly-developed picker declare that the machine will pick clean and deliver into a wagon, from 400 to 600 bushels of corn a day.

(*Turn to page 55*)

LOOKING THINGS OVER

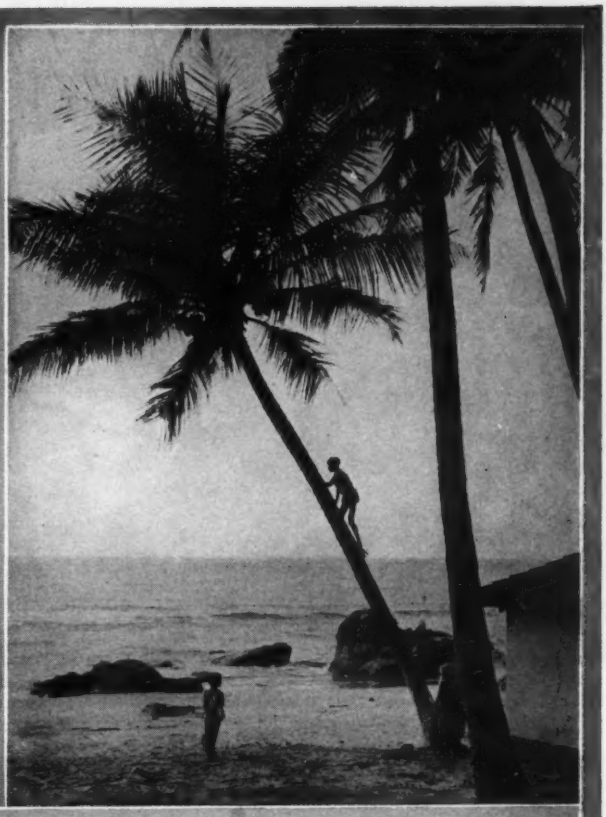
PICTORIAL



Left: This scene is of the grain market at Haifa, Palestine. Almost as much excitement sometimes prevails here as on the floor of one of our big grain exchanges.

Below: Spanish milk purchasers can see what they are getting here. This milk shop in Madrid goes the popular shops of Holland one better. A number of milk-producing cows are kept in a room adjoining the salesroom and in full sight of the customers who are thus convinced that they are getting the genuine article.

Right: Whenever a Ceylonese wants cocoanuts, he makes a monkey of himself and goes right up the tree to get them. This picture was taken at Mt. Lavinia, Ceylon.



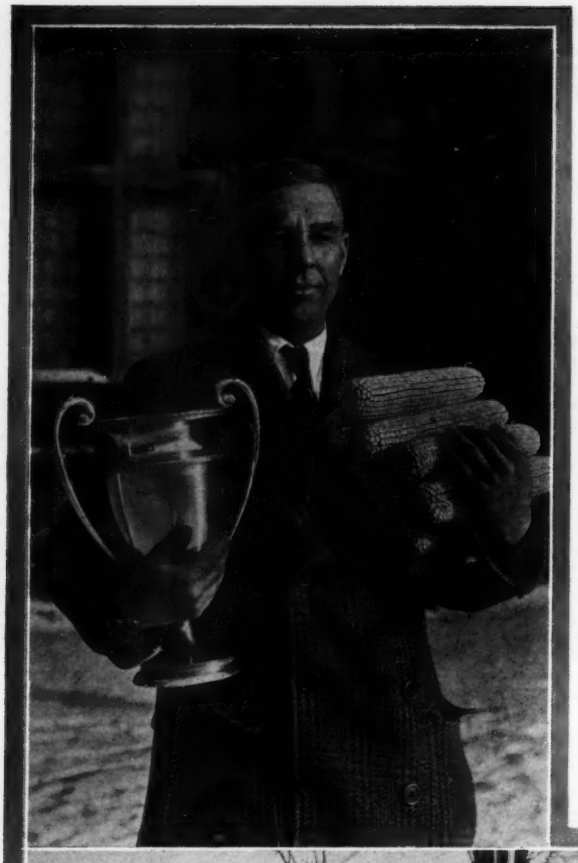
Below: Chinese fishermen let cormorants do their catching. Strings around the necks of the birds prevent them from swallowing the fish they grab with their beaks. The man pulls up both bird and fish, takes possession of the fish, then releases the bird for more work. Here is a fisherman fishing with cormorants on the Grand Canal.

A. A. Goodman, county agent for San Miguel county, Colorado, stops to admire the pet of Mrs. Roy Stone. "Pigs is pigs," says Mrs. Stone, "but this little fellow is just a little more intelligent than the rest."

Raymond Butterbaugh of North Manchester, Indiana, has two Chester White sows which have brought him fame. One of them won a first prize at the 1928 State fair, and from their litters he won first, second, third, and other prizes this year.

A free library on wheels is supported by Cass county, Indiana. It travels twenty-five miles a day through the county, five days a week, and has been in operation for nine years serving the rural schools and farm homes.

This does not happen to be in Iowa—"Where the tall corn grows." It is, however, in the sister State, near Carrollton, Missouri, and shows a fine concrete road, winding like a ribbon through a veritable forest of corn.



Left: L. M. Vogler, Hope, Indiana, with the ten ears of corn that won him grand championship at the International Hay and Grain Show, Chicago, and the cup which he was awarded for the distinction. "Everything enters into the growing of show corn," said Mr. Vogler. "Good seed is the first requisite, then the soil, fertilizer, cultivation, and other factors enter in. I used a complete fertilizer on my plot of corn, the analysis being 4-24-12."

Below: Louis Withrow, Romney, Indiana, with two piles of corn from a fertilizer experiment. The corn at the left received an 0-28-12 fertilizer and averaged 70.8 bushels per acre. That at the right was unfertilized and averaged 47 bushels per acre. The field in which this corn was raised was fertile, and the main reason for such a difference in yield was caused by wet weather. The unfertilized did not get started quickly and was drowned out, while the fertilized corn shot up rapidly and was out of danger from wet weather in a short time.

The Editors Talk

The New Year

With the advent of a new calendar year the attention of all agriculturists is drawn to the prospects for the farmer in 1930. Statements are appearing everywhere, some of them made by conservative students of the situation who temper their remarks with a warning not to look for any boom, others made by men less well versed, who charge their remarks with false optimism.

One of the best guides to the national situation is the annual report of the Secretary of Agriculture. Any outlook must be based upon past experience. Therefore, Secretary Arthur M. Hyde's review of the past year in agriculture is important in considering what may be expected during 1930.

In the beginning of his report to the President, the Secretary of Agriculture says, "Widespread drought during the growing season of 1929 dried up pastures and reduced crop yields below those of any recent year. The losses in production, however, were so evenly distributed for the country as a whole that no large area had either very bountiful or very short crops. Moreover, from the standpoint of the producers, reduced yields seemed likely to be more than offset by price advances. It is probable that the total income from agricultural production for the 1929-30 crop year will equal, if it does not exceed, that of the 1928-29 season. . . .

"Growers planted a total acreage about equal to that of 1928. Yields were disappointing in practically all crops, except irrigated crops and some varieties of hay. The hay crops that turned out well made heavy growth before the drought became severe. All crops combined gave a yield per acre of 7.4 per cent below that of 1928 and 4.1 per cent below the average for the preceding 10 years. Lower than average yields were experienced in 29 States."

In order to have any clear conception of the situation, it is important to get a picture of the important key crops—corn, cotton, wheat, tobacco, potatoes, beef, sheep, hogs, and dairy products.

The corn crop with the exception of the year 1924 was the smallest since 1918. Wheat production was between four and five per cent less than the annual average for the previous five years, although the harvested acreage was about nine per cent larger. Although this season's wheat crop is considerably smaller than that of 1928, it may return the growers a larger income.

In 1928-29, the cotton producers received a lower price per pound, but for a larger crop. They received about the same amount of cash as in the previous year. Yields were greatly reduced by drought in Oklahoma and in much of Texas. The eastern part of the Cotton Belt had about an average yield.

The potato production was about 24 per cent less than in 1928. It seems probable that the reduced potato crop will bring the farmers considerable more money than the last year's heavier crop brought them. Should present prices prevail for the marketing season, the income from potatoes will be approximately 75 per cent greater than in 1928.

Tobacco production was above that in 1928 and above the average for the previous five years. The crop was planted on an acreage nearly six per cent

greater than that of the previous year and yields were about the same. The quality of the crop was better while prices for most kinds are at least equal to those of last year.

The livestock industry in 1929 made further improvement. Certain branches of the industry showed losses but gross returns to livestock producers in the first eight months of the year were approximately $93,000,000.00 more than in the corresponding period of 1928. Gain in gross income was effective despite a decrease of over 1,000,000 head of meat animals slaughtered under federal inspection in the first eight months in the year as compared with 1928. The increased return from a reduced volume of sales was partly the result of higher average prices and partly of a higher average weight in the animals slaughtered.

In general, the position of the dairy industry has been favorable this past year, although not as markedly so as it was in 1928. Prices of butter, cheese, and other dairy products have not averaged as high as they did last year, largely because dairy production increased generally during the spring and summer months.

Poultry producers have received good prices for both poultry and eggs and their costs of production have not been unusually high.

Agricultural conditions in the United States continue gradually to improve. Farm incomes in the crop season 1928-29 averaged higher than those of any season since 1920-21, except 1925-26. The movement of population from the country to the town declined and the rate of depreciation in farm-land values declined also. This is evidence of improvement in basic conditions. However, further improvement will be necessary before the situation can be considered satisfactory.

On the demand side of the situation, there probably will not be any great change in the domestic demand. The year 1929 was a boom year in many lines of industry. It is not likely that production of manufactured products will be as great in 1930 as in 1929. Business for the year as a whole probably will be somewhat less active. This may mean slightly less purchasing power on the part of wage earners.

The foreign situation does not promise any great increase in demand for American farm products. However, the consumer purchasing power abroad will be as good as in the past year.

Agricultural conditions in the crop year 1929-30 were the best for any year since 1920-21 with the exception of 1925-26. That means that the agricultural situation is improved. This improvement seems likely to be continued in 1930.

The Fertilizer Situation

On the basis of improvement in our national agriculture, especially in the status of the growers of the chief fertilizer consuming crops, it is logical to expect improvement in the fertilizer situation. Even though the farm price of cotton is considerably less than a year ago, which is an adverse factor in the fertilizer outlook, yields of cotton in the eastern part of the Cotton Belt were greater than a year ago. Thus, the decrease in the value per acre for cotton has not been as great as the decrease in the price in many States, and in some of the important fertilizer States there is an increase

in the value per acre. This increase in value per acre will tend to stimulate fertilizer consumption.

Tobacco production is greater than last year but tobacco prices are much the same as a year ago. The situation in the tobacco States as well has not changed materially.

The high price of potatoes combined with the small crop will probably result in greater gross income to potato producers. The situation in the potato territory is much better than last year.

In the Midwest, the upward trend of fertilizer consumption will undoubtedly continue. An increase in the percentage of plant food per ton will undoubtedly continue. This picture for the fertilizer industry indicates an improvement over last year.

Fertilizers for Fruits

For many years the fertilizer recommendations for fruits have been nitrogen only. This advice has been almost universal, from coast to coast and from the Canadian boundary to the Gulf. In fact, our neighbors in Canada have followed it as industriously as we have in this country.

Then doubts began to creep in as to whether this program was complete enough. Reports indicated that the results obtained with nitrogen alone were not always as profitable as was to be expected. Experimental work here and there showed that on some tree fruits possibly phosphates and potash were beneficial. Here and there farmers found the same thing.

It is not surprising, therefore, that an editorial has appeared in "Fruits and Gardens," the official organ of the American Pomological Society, which makes the following significant statement: "It is possible and probable that after we have all the facts before us, we will settle down into much the same program of fertilizing fruit trees as is followed with other crops."

The editorial writer points out that in the fruit industry as well as in others, there has been a tendency to go from one extreme to another. This was done with pruning and has since seemed to be the tendency as regards fertilizers. After reviewing the developments and some of the evidence, the writer states:

"Already we are beginning to get some tangible evidence that we have gone too far in assuming that nitrogen only is needed in the fruit industry. The excellent results from manure, a complete fertilizer, and the insistence of many growers that it is the best fertilizer is an indication. A short time ago the New Jersey Experiment Station issued a report stating that during recent years the growers who have been carrying away the leading prizes at New Jersey fruit shows are those that have been using a well-balanced fertilizer."

Of course, there is little doubt on most fruits that nitrogen is needed. The point of issue is whether over a long period of years nitrogen alone will give the most profitable results. The writer draws particular attention to the preliminary reports given on the results of experimental work conducted in Virginia. These experiments were started in 1919. In the most recent report, Professor F. W. Hoffman of the Horticultural Department of the Virginia Agricultural Experiment Station, states, "From the results secured in both the Blacksburg and Crozet orchards, an application of a fertilizer carrying nitrogen, phosphorus, and potassium is most likely the safest blanket recommendation to offer." Professor Hoffman points out, however, that different varieties respond differently to fertilizers.

Everybody interested in horticulture will watch with interest the results of various experiments that are under way.

Time to Budget

January is the time to make the farm inventory and plan the budget for the year. Agricultural economists throughout the country are calling attention to this fact with suggestions for simplifying what to many farmers seems almost a hopeless undertaking.

According to O. M. Fuller, farm economist of North Dakota, an inventory is a simple and accurate means of determining the financial success of the year's business. It is simply a matter of listing the value of all property at the beginning of the year for comparison with a similar inventory made at the end. By comparing the two, it is easy to see whether or not the business is ahead or behind. In listing the property, it is essential that nothing be overlooked, including both debts and money loaned or in the bank.

The time is past when it is only storekeepers and commercial concerns that take an inventory of their business for the year. Farming represents a considerably larger investment than the average commercial concern and the value of the yearly inventory is just as great.

Without the information gained through an inventory, a farmer may think he has lost money when he is actually ahead, or that he is ahead when he has actually lost. Likewise without the inventory it is impossible to properly make a working budget for the new year. An important phase of the farm business which the inventory brings out is the effect of good care on the value of farm property and the continued productiveness of the farm.

An article in this issue on farm budgeting is of particular interest at this time.

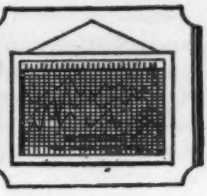
Soil Robbers

The fertility of the soil is the capital stock of the farmer. When that is gone his business is gone, except as he may resort to the use of commercial fertilizer. Nothing *in the world* responds more readily to fair treatment than the soil, but there is no reward for shiftlessness and inefficiency. The question of fertility is fundamental, and the conservation of it vastly more important than is realized by many.

There are two stages of crop production, first the destructive stage or mining of the plant food elements in the soil, and second the constructive stage —the realization of the need for replacing in the soil at least as much plant food as is normally removed by the crop grown. Too many American farmers are still in the destructive stage—in fact there are still agricultural leaders whose researches and teaching are still based on a definite chemical concept of soil fertility. Not until this concept is replaced by a more logical, a more natural concept—what the plant actually removes from the soil—will farmers cease to be soil robbers.

To maintain soil fertility at a high level of production costs money. This is natural. To maintain a savings account at any given level, large enough to return at normal interest a satisfactory income, requires a very definite initial investment. Once established, we cannot draw on it beyond a certain amount if a definite income is to be assured. If a larger income is desired, then the initial investment must be increased. And so it is with the soil. To maintain soil fertility at a high level of production, we must not take out more than we put in. It costs far less to maintain fertility than it does to restore it to a profitable productive level after it has been robbed by exhaustive farming practices.

AGRICULTURAL DEVELOPMENTS



By L. C. Farle

WEED KILLER PROVES TO BE FIRE HAZARD

Sodium chlorate is a successful weed killer, but, says R. H. Porter, a plant pathologist of Iowa State College, it is also a dangerous chemical. Even though it is efficient in killing the persistent Canada thistle, the College is reluctant to recommend it because it is inflammable and may catch fire in the field when the soil is good and dry. Wood or clothing or other organic matter when soaked with a solution of the chemical and then dried is a very dangerous fire hazard. Friction may set it afire. "A person walking through a field recently sprayed with sodium chlorate," says Mr. Porter, "may suddenly find himself surrounded by flames." An Iowa field which had been sprayed with 500 gallons to the acre recently caught fire spontaneously on a hot day. Tests indicate that calcium chlorate is nearly as effective as sodium chlorate and not nearly so inflammable.

NOSES OF THE TREES

Had Cyrano de Bergerac—he of the enormous nose and great imagination—known what science has just discovered about the fall coloring of the trees, he very well might have likened his craggy beak to a scarlet oak or a glowing gum tree. For the red of the autumn foliage, as is often true of the bulbous beezer, is the result of alcohol. The information on the cause of the warm leaf colors of the autumn woods comes from Samuel G. Hibben of the Westinghouse Lamp Company after long study of the effects of sunlight on plants and animals. It is a common belief that frost produces the color changes in leaves in the fall, but Mr. Hibben says that the activities of leaves slow down as they get old, and chemicals, among them alcohols, accumulate. The fall colors are the bloom of age.

ANESTHETIC USED ON COWS

Cows and most other animals have had a pretty hard time of it when troubled with serious diseases and derangements, or when injured. Even if the animals were brought through all right, it was often at the expense of a great deal of pain. Recently, however, a Vienna professor, Dr. Franz Denesch, demonstrated at the University of Pennsylvania a method for giving cows a local anesthetic, which he says is particularly effective in obstetric cases. The anesthetic is injected near the base of the tail, and in about two minutes the operation can be performed.

AMERICAN EXPERIMENT STATIONS COPIED IN EUROPE

Dr. Lipman, Director of the New Jersey Agricultural Experiment Station, recently back from Europe, reports that the European agricultural experiment stations and agricultural colleges are copying American methods, and showing a strong trend toward more practical work of more benefit to the farmer. At a German

experiment station near Munich elaborate soil maps are being made of individual farms, towns and counties, and the plan is eventually to cover all of Bavaria. The maps show the various soil types, and the needs for lime and plant food. Doctor Lipman says the German farmers are finding the maps an invaluable aid in maintaining productivity on their farms.

ONION SECRET SOLVED

Why do red onions and yellow ones resist smudge rot better than the white ones? J. C. Walker, plant pathologist at the Wisconsin College of Agriculture, discovered this peculiarity and propounded the question to the onions. For some time they refused to answer. He got the assistance of K. P. Link, a chemist of the same institution, and after many tearful sessions with the strong and the weak onions they found the secret. For a long time scientists have known that some plants resisted disease better than others of their kind, but, so far as known, these Wisconsin men are the first to find an actual substance that is responsible for the resistive quality in a plant. The substance found in the red and yellow onions which was absent in the white ones is an acid which has been named protocatechuic.

The disease smudge rot is serious in many of the northern and eastern States. It attacks plants while they are growing and continues its damage during storage, especially if the onions have not been thoroughly dried. Onion-seedling growers have lost much profit because of smudge rot, but many of them are now cutting losses by putting the seedlings in an artificial dryer.

LESS COMMON ELEMENTS IMPORTANT

The parts played in crop production by some of the less common elements were emphasized recently by Dr. Oswald Schreiner, president of the Association of Official Chemists, in an address before that organization in Washington, D. C. In his opinion there is much important work to be done in searching for the uses of these elements in agriculture and in industry. Large areas of soil in this country, he says, are lacking in some of these rarer but none-the-less essential plant foods. In this connection, he called attention to the results recently obtained by the Department of Agriculture in the use of manganese on tomatoes in Florida, and to experiments in the Everglades which have shown extraordinary benefits to crops from the use of small quantities of copper as a fertilizer. He mentioned other convincing results from nutrition studies on citrus trees.

SWEET SPUDS MADE FAT WITH POTASH

Potash fertilizer will make the sweet potato change its shape, scientists at the New Jersey State College of Agriculture have found. Consumers like "sweets" shaped more like an egg than like a shoestring. Since about 15,000 Jersey acres are devoted to this crop each year, it was important to find some easy way to reduce the high percentage of "slims." Good results in producing the chunky ones were obtained when a fertilizer containing 3 per cent nitrogen, 8 per cent phosphoric acid, and 8 per cent potassium was used at the rate of 1,000 to 1,500 pounds to the acre. The reason potash produces this favorable chunky growth—and this is an important new fact—is that potassium is necessary "to allow the complete formation of protein and protein-like substances in the plant, substances which are necessary for continued cell division and growth of the plant. It is this rapid cell division, provided it takes place in the direction of the root's diameter, which makes the potato chunky."

Cooperative Consciousness

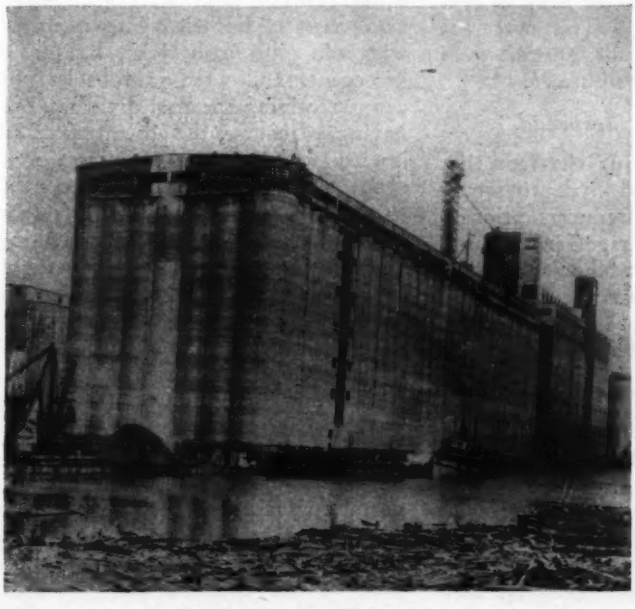
By Charles A. Lyndon

Lyndon, Alberta

(Continued from last month)

It takes more than mere volume, though, to make for success in co-operative enterprise, even granting that volume is a prime essential. The "co-op" that succeeds must show some practical advantage to its members; it must be able to instill an "esprit de corps" into those members in order to hold their loyalty; and it must meet business competition in a business manner. There is evidence to show that the Canadian Wheat Pools have not fallen down in these matters, while, on the other hand it must be admitted by pool opponents that the pools have gone a long step on the road to winning favor with the consumer, that important individual on the other end of the marketing job.

It has been said that more co-operative businesses fail because of poor or dishonest management and because of political entanglements than from any other causes. These western wheat growers' organizations seem to have avoided both of these pitfalls. No effort or expense has been spared to secure for the pools the very best executives in the various branches of the business. As a result, the organization contains a large number of men who received their training in the ranks of the large line grain corporations. As to the political feature, there seems to have been constant and vigorous effort by



The world's largest wheat elevator is owned by the Canadian wheat pool and is located at Port Arthur, Ontario.

the directorate in the right direction. In a region where Government is dominated by the agricultural population, as has been the case in the prairie provinces since the war period, it would be no difficult matter for the pools to become entangled with the rural party with which they are undeniably in sympathy, as a majority. It has only been through the conscientious effort of far-sighted men on the directorate that the pools have steered their own course and left politics to the politicians. The governments of the prairie provinces have stood ready to assist the pools wherever legislative action was necessary, but there has been no attempt to turn this into paternal supervision of the organizations. Anything that looked like such has been deftly avoided by the growers.

The Grain Trade, in keeping with their rights as business corporations opposed to the pool idea, have instilled a new note of vigor into the struggle for control of Canadian wheat. Not only have they united to fight the pools by propaganda, but each individual company has gone more vigorously than ever into the fray to win over the producer. This war has brought benefit to the grower, even financially, as we shall see.

Benefit Is Widespread

There is no denying the fact that grain companies had little to worry over in regard to producers prior to war years. The average farmer knew practically nothing of how his wheat was marketed. He was content to sell for what the companies considered the proper price. No doubt this led to abuses. Today we note several outstanding changes that have been wrought by the challenge of the pools. Pool policy necessarily depends upon grower interest being maintained. Directors and field-men, together with the system of interim payments, keep member interest alive throughout the year. The grain companies are now even entering the radio broadcasting field in an effort to keep before the public throughout the year. Where all were previously content to leave the farmer uninformed, they are now equally anxious to keep him informed. It requires no reading between the lines to find who is benefiting.

Two interesting details will serve to show how the farmer is receiving financial benefit through this wheat trade struggle. The pools have found that they are able to operate their country elevators at considerable profit. In 1927-28, they found that, after laying aside 6 per cent interest on elevator reserve deductions, 5 per cent for depreciation, payment of elevator operating expense, and a nucleus of a sinking fund, they were able to pay back to members a really substantial dividend from elevator earnings. Those members who paid the elevator 2½ cents a bushel to "special bin" their wheat received back as dividend, 3½ cents a bushel, and so made a clear profit of one cent per bushel on that transaction alone. Those who loaded to pool terminals over a loading platform, no elevator being available, paid three-fourths of a cent per bushel charges and were paid back two cents a bushel. The members who sold on a cash ticket basis paid 4½ cents and were paid back four cents, receiving the least dividend, but having, of course, the advantage of an immediate cash payment. These dividends mean a substantial cash benefit to western farmers, and indicate that someone has apparently been making considerable profit in the sphere of elevator operation alone. Action by the pool in announcing patronage dividends has already led one grain company to adopt the same policy, and this is one more instance where the pools have brought financial betterment to non-pool growers.

The flooding of elevators and transportation facilities by the wheat rush in fall months has become even more serious than previously since the advent of the combine and the farm truck. It was in the first real effort

(*Turn to page 59*)

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Field and Sand Culture Experiments on Fertilizing Asparagus" is the title of the new Bulletin 314, Maryland Agricultural Experiment Station. The use of commercial fertilizers to replace manure or as a supplement to manure is ably discussed by the authors, Thomas H. White and Victor R. Boswell. Briefly, the nine years' results reported show an annual increase of 35.99 per cent for 1,250 pounds per acre of a 7-3-5 fertilizer as against an increase of 28.00 per cent for 10 tons of manure. Regarding time of application of manure, spring application out-yielded summer application six out of nine years.

Another new Maryland bulletin, No. 311, "Fertilizer Studies and the Production of Sweet Potatoes," by Fred W. Geise, reports results of a five-year study of the influence on yields of nitrogen, phosphoric acid, and potash on sweet potatoes used separately and in combination. The mean relative increases over the mean of the check plots were for potash alone, 160.5; phosphorus - potash, 179.1; nitrogen - phosphorus - potash, 187.4; nitrogen-potash, 199.6 per cent, respectively. Plots treated with muriate of potash alone or in combination with nitrogen or nitrogen and phosphorus gave the largest return of any of the treated plots. Treatments without potash gave increases, but only about one-half as large as the plots containing potash.

"Fertilizer and Cottonseed Meal Analyses Report," Dept. of Conservation and Inspection, Little Rock, Arkansas, 1928-29, Dr. W. F. Manglesdorf and G. W. Roark.

"Report on Inspection of Commercial Fertilizers," Agr. Exp. Sta., New Haven, Conn., Bul. 308, Sept., 1929.

"A Fertilizer Study on the Brown Soil of the Red Praries," Agr. Exp. Sta., Stillwater, Okla., Bul. 188, July, 1929, H. F. Murphy.

"Fertility Studies on Kirkland Soil," Agr. Exp. Sta., Stillwater, Okla., Bul. 189, June, 1929, H. F. Murphy.

"Commercial Fertilizers in 1928-29 and Their Uses," Agr. Exp. Sta., College Station, Texas, Bul. 403, October, 1929.

Soils

"Soil Survey of The Chico Area, California," U.S.D.A. No. 4, Series 1925, E. B. Watson, T. W. Glassey, R. Earle Storie, and Stanley W. Cosby.

"Soil Survey of King City Area, California," U. S. D. A. No. 24, Series 1924, E. J. Carpenter, A. E. Kocher, and F. O. Youngs.

"Soil Survey of Iowa, Delaware County," Agr. Exp. Sta., Ames, Iowa, Report No. 56, May, 1929.

"Soil Survey of Iowa, Jones County," Agr. Exp. Sta., Ames, Iowa, Report No. 57, May, 1929.

"Soil Survey of Iowa, Fremont County," Agr. Exp. Sta., Ames, Iowa, Report No. 58, May, 1929.

"Soil Survey of Iowa, Cherokee County," Agr. Exp. Sta., Ames, Iowa, Report No. 59, May, 1929.

"Soil Survey of Middlesex County, Massachusetts," U. S. D. A., No. 26, Series, 1924, W. J. Latimer and M. O. Lanphear.

"Initial Soil Moisture and Crop Yield," Agr. Exp. Sta., Stillwater, Okla., Bul. 192, June, 1929, H. H. Finnell.

Heavy Plains Soil Moisture Problems," Agr. Exp. Sta., Stillwater, Okla., Bul. 193, June, 1929, H. H. Finnell.

Economics

In order to have an efficient marketing system for any commodity, all steps in the marketing process should

be efficient. A new Minnesota bulletin, No. 251, "Economic Aspects of Local Elevator Organization," is a study of the proper business set-up of local elevators. The authors are Hutzel Metzger and H. Bruce Price. While there are many factors that affect the efficient organization of elevators, the volume of business is one of the most important. Elevators marketing less than 125,000 bushels of grain have substantially higher costs than those with a larger volume. Labor and management is the second important factor affecting costs. The amount of labor used is more important than the rate paid. Elevators marketing less than 100,000 bushels and doing an ordinary sideline business cannot afford to employ more than one regular man. Equipment, buildings and sidelines are other factors that affect the efficiency of the local elevator.

"Cost of Producing Crops on Irrigated Farms," Agr. Exp. Sta., Fort Collins, Colo., Bul. 353, September, 1929, R. T. Burdick and H. B. Pingrey.

"Outline of Colorado Tax Laws for Farmers and Ranchmen," Agr. Exp. Sta., Fort Collins, Colo., Bul. 355, October, 1929, G. S. Klemmedson and C. C. Gentry.

"Services of Rural Trade Centers in Distribution of Farm Supplies," Agr. Exp. Sta., University Farm, St. Paul, Minn., Bul. 249, October, 1928, H. Bruce Price and C. R. Hoffer.

"Ohio Agricultural Statistics for 1928," Agr. Exp. Sta., Wooster, Ohio, Bul. 442, September, 1929, Dept. of Rural Economics.

"Problems in Cooperation and Experiences of Farmers in Marketing Potatoes," U. S. D. A., Washington, D. C., Cir. No. 87, October, 1929, T. B. Manny.

Crops

In the new "Agricultural Program for North Carolina," extension circular No. 175, there is a concise and understandable discussion on the management of the major crops of the State. The program also considers in the same well-thought-out presentation the other agricultural problems of the commonwealth. In the discussion of soil management, there is this significant statement, "The fundamental need of most North Carolina soils is increased fertility. . . . Under present cropping systems, the original organic matter contained in most North Carolina soils has gradually been depleted and very little is being done to replace it." Logical steps for increasing fertility are then given.

"Alfalfa Production," California Agr. Ext. Serv., Cir. 35, October, 1929, B. A. Madson.

"Monthly Bulletin of the Department of Agriculture State of California," Sacramento, Calif., Vol. XVIII, No. 10, October, 1929.

"The Australian Saltbush," Colo., Exp. Sta., Fort Collins, Colo., Bul. 345, May, 1929, Wm. P. Headden.

"Variety Studies of Spinach," Agr. Exp. Sta., College Park, Md., Bul. 312, July, 1929, Fred W. Geise and H. B. Farley.

"The Production and Marketing of Strawberries on the Eastern Shore of Maryland," Agr. Exp. Sta., College Park, Md., Bul. 315, August, 1929, W. E. Whitehouse, W. J. Hart, and W. P. Walker.

"Seed Corn Selection and Germination Tests," Agr. Exp. Sta., University Farm, St. Paul, Minn., Spec. Bul. 125, July, 1929, H. K. Wilson and R. F. Crim.

"The Influence of Fallow on Yield and Protein Content of Wheat," Agr. Exp. Sta., Bozeman, Mont., Bul. 222, July, 1929, Edmund Burke and Reuben M. Pinckney.

Ohio Agricultural Experiment Station, Bimonthly Bulletin, 141, Wooster, Ohio, November-December, 1929.

"Fruiting Habit of the Cotton Plant," Agr. Exp. Sta., Clemson College, S. C., Bul. 261, October, 1929, T. S. Buie.

"Forest Planting in the Lake States," U. S. D. A., Washington, D. C., Bul. 1497, June, 1929, Joseph Kittredge, Jr.

"Breeding Hard Red Winter Wheats for Winter Hardiness and High Yield," U. S. D. A., Washington, D. C., Tech. Bul. 136, September, 1929, Karl S. Quisenberry and J. Allen Clark.

"Work of the Newlands Field Station, Nevada 1924-27," U. S. D. A., Washington, D. C., Cir. 69, September, 1929, E. W. Knight.

"Cigar-Tobacco Production in Pennsylvania," U. S. D. A., Washington, D. C., Farmers' Bul. 1580, July, 1929, Otto Olson.

"Varieties of Hard Red Winter Wheat," U. S. D. A., Washington, D. C., Farmers' Bul. 1585, June, 1929, J. Allen Clark and Karl S. Quisenberry.

"Reed Canary Grass," U. S. D. A., Washington, D. C., Farmers' Bul. 1602, August,

1929, *H. A. Schoth.*

"Planting and Care of Shelter Belts on the Northern Great Plains," U. S. D. A., Washington, D. C., Farmers' Bul. 1603, August, 1929, Robert Wilson

"Lettuce Growing," U. S. D. A., Washington, D. C., Farmers' Bul. 1609, November, 1929, W. R. Beattie.

"Department of Agriculture Immigration of Virginia," Bul. 264, December, 1929.

Insects

"A Progress Report on the Testing of Sulfonated Oxidation Products of Petroleum for their Insecticidal Properties," Agr. Exp. Sta., College Park, Md., Bul. 310, June, 1929, John L. Hoerner.

"Control of Tobacco Insects," N. C. State College of Agr. and Eng. and U. S. D. A., Raleigh, N. C., Ext. Cir. No. 174, October, 1929.

Diseases

A new bulletin, No. 268, on the "Control of Oat Smut by Seed Treatment," has been issued by the North Carolina Agricultural Experiment Station. The authors are S. G. Lehman and G. W. Fant. This should prove very welcome to the great number of growers who are looking for latest information on the control of this profit-stealing disease.

"The Preparation and Effectiveness of Basic Copper Sulphate as a Fungicide," Agr. Exp. Sta., Amherst, Mass., Bul. 254, June, 1929, E. B. Holland, C. O. Dunbar, G. M. Gilligan, and W. L. Doran.

"The Overwintering of the Tobacco Mosaic Virus," Agr. Exp. Sta., Madison, Wis., Bul. 95, June, 1929, James Johnson and W. B. Ogden.

Keeping Step With Progress

(*From page* 20)

crease will pay a handsome profit on the investment.

Four dollars worth of plant food to the acre is the best insurance policy that can be bought to assure a stand of clover or alfalfa. The fertilizer pays a premium on the investment when the grain nurse crop is harvested and an added return on the legume hay to follow. Crops do not belong to the Union. They will work without even getting hot, but they must be properly fed if the harvest is to be most bountiful. Fertilizer attachments to planters and seeders are available to provide proper distribution of commercial plant food with most convenience.

In order to fully cash in on quality crops, it is essential to grow them with quality plant foods. The fertilizer should always be applied with the proper equipment. It is not difficult to learn how to economically use commercial plant foods. One can quickly learn the way to balance rations for crops. Just as a cow tester learns how different individuals of the herd require different rations, so it is found that different fields need special fertilizer treatments. Every acre of soil in the country where a rainfall of 25 inches or more prevails will yield better if treated with phosphates. For clover and alfalfa, a mixture of phosphate and potash is usually the thing to apply. Corn, potatoes, and truck ordinarily respond best to a complete mixture.

Not a tenth of the farmers who could profit by the use of commercial plant food in the United States are now employing it. Of those who are using fertilizers, few apply an optimum amount for greatest returns, and the majority who are using commercial plant food are not applying half enough to the acre. American farmers are intelligent. They have accepted modern methods of culture, applied power to their farming operations, and they are now rapidly learning that by generously using commercial plant foods to grow quality crops at minimum cost, it is possible to further improve their position.

Tours and field meetings create and increase interest in alfalfa growing.

The Defeat of Old Man Winter

(*From page* 24)

The Wisconsin investigators point out that soil acidity, as is commonly supposed, is not the real cause of many legume failures, for legumes will often do well on acid soil if they have a plentiful supply of calcium. It is possible to have calcium without having a neutral or alkaline soil.

Soil specialists have been working for a number of years to find the real cause of soil acidity until just recently when scientists at the Wisconsin College of Agriculture found that alumino-silicic acid is perhaps the only inorganic compound responsible for soil acidity. This newly isolated acid under the trade-name "white rock" is used to pack horse hoofs which have become unnaturally dry. When lime is applied to the soil it reacts with this acid and forms a neutral calcium salt.

So it may be seen that the problems which arise in the production of legumes are indeed dependent upon each other, but fortunately there are some factors which can be controlled or influenced. Still more fortunate is the fact that by bettering one condition others often are improved. For example, fertilization with potash increases yields and at the same time gives the plants greater resistance against unfavorable winters; and the correction of soil acidity leads to the greater effectiveness of other fertilizer applications.

In commenting upon the extremely favorable winter due to heavy snows in Wisconsin and the Midwest last year, Mr. Graber issues a warning that it may be another score of years before such a winter is experienced again.

But there need be no alarm over winter-killing, because much of it may be prevented by fortifying the soil with applications of fertilizers, particularly potash on soils which have a tendency to be sandy or peaty or wherever analyses show a need for it.

NO BARGAIN

Wife—"I see by this paper that in certain parts of India a wife can be bought for two dollars. Isn't that perfectly awful?"

Husband—"Well, I don't know! A good wife would be worth that."

Pages From A Field Note Book

The Value of Legumes

By F. E. Charles

Kansas State Agricultural College

BENEFICIAL results through the use of the legumes—alfalfa, sweet clover, and soybeans—when used in rotation with other common crops, have been demonstrated in experiments recently conducted at the Kansas agricultural experiment station by Dr. M. C. Sewell. The tests were made to study the legumes with special attention to the amount of nitrogen fixed by each and their effect on the yield of corn in a rotation consisting of corn, oats, and wheat.

When alfalfa or sweet clover was allowed to grow but a single year in a rotation, the yield of corn was increased more than 25 bushels per acre. This rotation without the legume yielded 68.4 bushels an acre. When alfalfa was used in the rotation the corn yield was increased to 93.9 bushels an acre.

On a plot in which sweet clover was added to the corn, oats, and wheat rotation, the corn yield was 94.7 bushels an acre. Without the sweet clover, the yield was 68.4 bushels. The alfalfa and sweet clover were allowed to stand for only one growing season and were plowed up the following spring.

In another series of tests when soybeans and sweet clover were allowed to grow but one year in the rotation, the corn yield was increased about 25 bushels an acre. On this series of plots where the rotation of corn, oats, and wheat was used without a legume, the yield of corn was 61 bushels an acre compared to the corn, oats, and wheat rotation followed by sweet clover which yielded 85.2 bushels. Soybeans used in the same rotation increased the yield to 86.2 bushels per acre.

Since both series increased the yield about 25 bushels an acre the difference in total yield between the two series was probably due to a difference in the soil itself, Doctor Sewell pointed out. The rotation used in these experiments (corn, oats, and wheat) was used as representative of any common crop rotation.

Fertile soil, a farmer who knows how to maintain that fertility, and cows are three important factors in making agriculture prosperous.

Potash Important for Potatoes

Prevents Diseases; Increased Production Surprisingly Large; Use of Potash Profitable

(Reprinted from the September, 1929, issue of the North Central Quarterly, official publication of the North Central School of Agriculture and Experiment Station of the University of Minnesota, Grand Rapids, Minnesota.)

THAT large and profitable returns from application of potash fertilizer for potatoes can be expected is not news to those who have followed the research work at the North Central Experiment Station. The large returns from applications of potash fertilizers have been apparent year after year and have been reported in our Station bulletins and the public press.

The cause for the marked increase of yields, however, has been attributed to the supplying a necessary plant food element. Results this year indicate that this is not the sole reason for this increase. That potash also checks or prevents disease is sufficiently apparent to be conclusive. On plots where no potash was applied wilt killed from 10 to 50 per cent of the potato vines, while on the plots where potash was applied the plants have little or no infection and the production of tubers show differences of more than 200 per cent in favor of the plots where potash was added at the rate of 200 pounds or more per acre. An application of even 115 pounds of muriate of potash per acre was quite effective in checking the wilt.

Trials with farm manures and commercial fertilizers have been under way since 1915. The old phosphate manure projects to determine the effect of phosphate fertilizer upon different crops in the rotation when applied with and without stable manure showed over a four-year period (1915-1918) that the phosphate applications were not profitable either in the form of acid phosphate or raw rock phosphate. On the other hand, the increase in yields from applications of stable manure was surprisingly large. The average yearly increase for four years from applications of 1,000 pounds of raw rock phosphate was only 12.8 bushels per acre for potatoes, one bushel for oats, and 80 pounds for clover and timothy hay. The increase due to applications of acid phosphate at the rate of 360 pounds was 11.6 bushels per acre for potatoes, 1.2 bushels for oats, and 40 pounds for hay. On the other hand 10 tons of stable manure gave a four-year average increase as follows: 94.8 bushels potatoes, 7.3 bushels oats, and 860 pounds hay.

Peat as a Fertilizer

At the same time another project was carried on to determine the benefits from applications of raw peat upon the different crops in the rotation. Results for a five-year period indicated that peat in the raw form is not an efficient fertilizer. The average yearly increase was 3.4 bushels of potatoes from an application of 10 tons of peat per acre, 10.4 bushels from 20 tons, and 22.4 bushels from 40 tons per acre. That is, the increased potato yield was less than a bushel for each ton of peat applied.

On oats the raw peat gave larger increases but not sufficiently so to be profitable. The increases in the case of oats range from 2.8 bushels per acre from a 10-ton application of peat to 4.8 bushels from a 40-ton application. That is a return of from ⅛ to ⅓ bushels of oats for each ton of raw peat applied. For hay, the increase was only from 15 to 30 pounds for each ton of raw peat applied. What then is it that was supplied through applications of manure that showed such

marked benefit to the different crops in the rotation?

To determine this, the old phosphate project was modified by adding nitrogen fertilizer on some plots and potash on others in addition to the phosphate and peat. Where nitrogen fertilizer was added either alone or with phosphate, but little increase in the yield was apparent. However, where potash fertilizers were added the increase in every case was surprisingly large. These applications gave such striking results that they were repeated the following year (1921) and a more comprehensive project for trials with commercial fertilizers was begun.

This project consisted of 60 plots in two series. The south series received nitrogen and phosphate both alone and in combination. The north series received the same applications of nitrogen and phosphate and in addition 230 pounds per acre of muriate of potash. Treatments with complete fertilizers, including nitrogen, phosphate and potash, were also made at different rates from 300 to 1,200 pounds per acre.

Results from these treatments over a period of six years showed a small but definite increase on all crops from the application of nitrogen. The application of phosphates increased the yield of oats, but gave no increase on potatoes and hay except when applied in combination with potash.

The applications of potash give marked increases on all crops in the rotation. Muriate of potash applied at the rate of 230 pounds per acre gave a yearly average increase over an eight-year period of 78.2 bushels of potatoes, 3.4 bushels of oats, and 1,200 pounds of hay per acre. The application was made once in the rotation, that is, once each three years. The applications preceded potatoes, so that the effect on the grain and hay was residual. Since the 230 pounds of muriate of potash costs approximately $8.00, there was a return from each dollar invested of about 10 bushels of potatoes, one-half bushel of oats, and 150 pounds of hay. The actual profits from the investment, of course, are determined by the market price of potatoes, oats and hay.

These results indicate, however, that potash fertilizer may be profitably used on the silt and sandy loam soils of this district when the supply of farm manure is limited.

Putting Pep Into Asparagus

By E. R. Lancashire

Extension Specialist, Ohio State University

THE methods used in putting pep into asparagus plantings depend somewhat upon the age of the beds. The quality and the yield of the tender succulent spears are largely determined by the growth of the fern-like tops. Vigorous top growth assures the right result.

A new planting of asparagus roots, preferably one year old, should be made as early in the spring as possible, so that the top growth will have the advantage of a long season the first year. To insure quick growth the soil should be light, well drained, and far better supplied with organic matter than most soils are. In fact, it is best to delay operations a year or more if necessary to secure the much needed organic matter supply. A crop of soybeans, sweet clover, or cowpeas turned under green will go a long way toward insuring a peppy asparagus planting. These green manures should be reinforced by the fall application of 30 to 40 tons of barnyard manure previous

to setting out an asparagus bed.

Just before setting the roots, a heavy application of fertilizer should be applied broadcast and worked into the soil. One thousand pounds or more of a 2-12-6 or a 4-12-4 would be very good for the asparagus crop at this time. The nitrogen should be readily available and the potash should be of the muriate form. The chlorin in the muriate form of potash is thought to be valuable. Three applications of nitrogen can be made during the season to good advantage. Some soluble, readily available form is best. Making these two or three weeks apart will be helpful in preventing unnecessary loss of nitrogen. A hundred pounds per acre each time applied along the rows just before a rain will insure rapid, continued top growth, as well as conservation of the materials used.

After the tops are killed by frost the first year, they should be harrowed down and worked into the beds. A heavy application of manure should be worked in at the same time. Operations will then be completed for the first season.

To insure a quick growth the second season, the beds should be fertilized with 1,000 pounds or more per acre of a 2-12-6 or a 4-12-4. This can be worked into the soil with the early cultivations. The second fall the beds should be treated exactly as they were at the end of the first season.

Treatment in the third and succeeding years of the asparagus bed's existence consists of applying the chemical fertilizers about five or six days before the end of the cutting season. The tops and the barnyard manure applications are handled just as during the first two years.

Experiments show that it does not pay to cut asparagus for more than three weeks during the third season. Increasing the length of the cutting period gradually will usually give the best returns in succeeding yields and in increased quality resulting from better early root development. In sections of the country where the growing season is extra long, the harvesting is often begun during the second season, but this is not advisable in the majority of cases.

Ira Waters—Potatoes

By A. E. Wilkinson

Professor of Vegetable Gardening, Connecticut Agricultural College

WHAT do you think of a grower who obtains a yield of potatoes over two and one-half times the average for his State? With many growers in Connecticut, in fact almost all, the average is about 120 to 125 bushels per acre. Mr. Waters produced 327.4 bushels per acre during the year 1929, and 1929 happens to be one of the driest years that we have had for some time. This yield is only seven bushels higher than Mr. Waters obtained in 1928. During 1928 he produced 320.6 bushels per acre and 1928 was one of the wettest years we had experienced for some time. From this it does not seem to matter with Mr. Waters whether it rains or whether it does not rain. He gets the spuds.

Mr. Waters claims there are two outstanding points that give him these high yields. The first is that he uses an abundance of excellent fertilizer. Mr. Waters has gone back to an old formula, the 4-8-10, not particularly that he needs 10 per cent potash but he likes to have plenty in the soil. He

also uses a reasonable amount of castor pomace with his 2,500 pounds of the complete fertilizer. He then has enough fertilizing material to supply the plant needs throughout the season.

The other point which Mr. Waters claims is the reason for his high yield is due to the fact that he controls plant pests. Aphids or lice, potato beetles, both the flea beetle and the Colorado type, leaf hoppers or blight, are all the same to him. He uses a power duster, applying plenty of dust and giving complete coverage at all times.

I agree with Mr. Waters that these two things are important, but I do not believe that they are the sole points that give him approximately 119 barrels per acre. As I see it, the points are as follows:

First, Mr. Waters loves potato raising. He not only likes to grow potatoes, but likes to be in touch with men who are exceptional growers in other sections of his State or nearby States. He reads all the literature available on the subject. He talks with College Specialists, County Farm Bureau Agents, editors or writers for agricultural papers, fertilizer dealers, spray and dust dealers, implement dealers, and any others that come in contact with potato raising. It is easily understood that Mr. Waters is not then just an average potato grower. He is one of the better, more progressive type, head and shoulders above the average.

Second, he buys the best certified seed, not because it is certified, but because the man back of the certified seed is an honest, reliable, painstaking certified seed grower.

Third, he prepares his land thoroughly, deeply, and finely and this is done early in the year; if on sod, it is fall plowed. Plowing takes place in late March, and the potatoes are planted in May. The potatoes are cut to large size pieces, having at least one strong eye. They are put in the ground with a planter 12 to 13 inches between pieces and three feet between rows. The pieces are approximately three inches deep.

This is how the yield of 327.4 bushels of potatoes per acre looked on the ground at Ira Water's farm, New Milford, Connecticut.

Fourth, the potatoes are supplied with a liberal application of plant food known as fertilizer. Mr. Waters broadcasts one-half ton of castor pomace on each acre. In the planter 1,000 pounds per acre of 4-8-10 are used. When the potato plants come above ground, 1,500 pounds of 4-8-10 are broadcast and worked in. He is thus assured of enough plant food to carry the crop throughout the season.

Fifth, the potatoes are kept clean by frequent cultivation. Mr. Waters and his men have gone over the potatoes this year nine times with a cultivator. He does not believe in deep cultivation but in shallow cultivation and low hills.

Sixth, Mr. Waters believes thoroughly in controlling pests. He uses dust. During the present year he made 10 applications of Bordeaux dust and 12 applications of other dust, making 22 times he dusted over his fields. He drove away the flea beetles with the Bordeaux and killed the aphis with nicotine dust. He kept the leaf hoppers on the move by using Bordeaux and nicotine, and it was most necessary to do these things in the present year. Of course he does four rows at one time with a good power duster.

Mr. Waters believes in advertising. Also he believes in helping his fellowmen, particularly his neighbors. As an advertiser he has four signs on his farm, two on the right side of the road and two on the left side. The first one states:

Ira Waters, Market Gardener
32 Years Experience
Yours for a Square Deal

And a little further on is another sign which states:

Ira Waters—Potatoes
"Watch How We Grow Them"

He thus tells the world what he is about and is willing for them to see. In fact, he is not ashamed of his potatoes, and his neighbors are very proud of him.

On October 1, he invited all of his neighbors and anyone else interested to gather at his farm and see the potatoes dug, weighed, and measured. A large number of people took advantage of this opportunity.

Mr. Waters had an acre of potatoes dug and his modern engine type digger was throwing out the potatoes on an additional acre. The potatoes laid thick in the row and were of good size, in spite of the dry weather. About two o'clock in the afternoon each grower was given a printed card:

IRA WATERS' FIELD DAY

No. of Bushels.....

Name..... Address.....

Each one was requested to guess on how heavy a yield would be found when the potatoes were gathered. In order to make it interesting, three prizes were offered. The crowd scrambled for the cards. The potatoes were picked up and weighed, and it was found that 327.4 bushels per acre was the total yield. On examining the cards, two growers had guessed 325 and one had guessed 330. The prizes were given to these three men.

As an added attraction a picking-up contest was staged, 13 men entering this contest. Rows 100 feet long were measured and the contestants were started together at one end. In just exactly 3 minutes and 25 seconds from the start Ira Waters' son Albert came in first having picked up 131 pounds of potatoes. William Roraback was seven seconds back of Albert picking up his 132 pounds in 3 minutes and 32 seconds. In exactly four minutes, William McKay of North Danbury came in. He had approximately the same number of potatoes as the others in pounds. Of course there is always someone to be first and someone to be last and T. Anderson was the last one in requiring over five minutes to pick up his potatoes. He had just a few more pounds to pick up but was very slow. As a consolation, he was given a lollypop. Suitable prizes were awarded to the others.

What's Ahead?

(*From page* 30)

John A. Hopkins, Jr., of the Iowa Agricultural Experiment Station, in a report of the results of a recent survey of farms in Iowa county, declares that "on the typical Iowa county farm of 160 acres with about 100 acres in crops, it should be possible, if the more effective sizes of machines are used, to get along with five horses. On a farm of this size a tractor in addition to the horses is generally of doubtful economy unless the farmer can use a general purpose, cultivating tractor and displace some of the horses. The four or five-horse team is needed for the greater amount of the usual crop growing operations. The addition of a tractor even to a team of four horses would give the farm a power supply equal to eight or nine horses. This is decidedly more than is needed and involves an unnecessary expense.

"A quarter section in this farming area is essentially a one-man farm. It would, therefore, be poor economy to maintain sources of power sufficient to keep two men employed. Where a tractor is kept on a small farm, the number of horses will usually be kept down to four, since this is the size of the team used on most of the operations except plowing and sometimes discing. But reducing the number of horses to four decreases the effectiveness of the outfit in plowing and perhaps discing. Also there is an advantage in having an extra horse during the rest of the year to change about, or in case one horse is incapacitated for a while.

"On farms of somewhat larger size, a tractor generally becomes an economy. For a 240-acre farm with about 150 acres in crops, five horses and a tractor may be expected to furnish sufficient power. This provides an effective team of horses for any ordinary farm operation, and an auxiliary source of power for use in the rush season when preparation of the soil for crops demands the use of two outfits. The addition of a sixth horse may be convenient during the corn cultivating season since it permits the operation of two two-row cultivators of the three-horse type. If a second two-row cultivator may be pulled by the tractor, the number of horses on the 240-acre farm can usually be kept down to five."

I recently asked a farm management man who is regarded as one of the best informed experts in this country in this field as to what he would do if he were to go into farming in the Corn Belt. He said that he would undertake a 160 to 240-acre farm at a cost of around $200 an acre, and expect to secure a labor income of about $2,000 above operation expenses and 5 per cent on his capital investment. "That $2,000," he said, "would be equivalent to a salary of $4,000 in city employment." He pointed out, however, that the $2,000 labor income is from 50 per cent to 100 per cent more than the common average at the present time.

AMERICAN HONEY ON HIGH STANDARD

The methods of handling honey in the United States have been developed to the same high sanitary standard as that followed by the bees themselves, says the United States Department of Agriculture, which adds that buyers are now doubly assured of getting clean honey. The department adds that because of the high sugar content organisms injurious to human health will not multiply in it. This is one product in which the farmer's livestock works with him to keep it sanitary.

Tame Hay

(*From page* 26)

river and north of the Ohio river, with considerable production in a few States west of the Mississippi river, such as Minnesota, Iowa, and Oregon. Clover seed production varies much from year to year depending upon the manner in which the clovers survive the winter. The two most important clover seeds are alsike and medium red clover. The alsike clover seed is made from the first cutting of the crop, whereas the red clover seed is taken from the second cutting.

Timothy seed production is distributed in a region including the principal area of clover seed production, but the greatest concentration is found just west of the main clover seed regions. Iowa is the leading timothy seed State, producing over one-third of the nation's output in recent years. Missouri usually ranks second and Illinois third.

Sweet clover seed is produced more largely in the western States, South Dakota being the leader, with North Dakota and Minnesota usually ranking second. Nebraska is also an important sweet clover seed State. The alfalfa seed area lies still farther west, there being no important seed production east of the Mississippi river. Utah, Arizona, Idaho, Nebraska are usually the leading producers of alfalfa seed.

Question-box Meetings

(*From page* 22)

Our modern educators tell us that it is sound teaching to go from the known to the unknown. This is done in the question-box meeting. Farmers tell of their experiences and conclusions based on things they have done and seen. The chairman of such a meeting can often lead from the "How" of doing things to the "Why" or underlying principles. With these principles in mind each farmer can then study out the practices which apply best to his own conditions. In other words the act of doing the thing is tied up in the science of doing it. Try a question-box meeting and see for yourself what the results will be.

Champions

(*From page* 15)

realized last year that I had to do something to raise more feed, especially during the dry summer months. There we were, with about 25 good dairy cows facing the usual Oregon summer drought. A green forage crop looked like the best bet. I took it on as a club project—about six acres of oats and cow peas. We fed it freely during the latter part of June, July, and early August and the results were quite amazing. Where our herd would always drop down to an average of about 20 pounds of milk a day, this summer they maintained a production of about 35 pounds a day."

Of course Edgar's green forage club project was just a part of the excellent farm management scheme on the 500-acre Grimes farm located in the picturesque Willamette valley. The livestock on the farm includes 50 cattle, 100 sheep, and some real pigs, while the 200 acres in crops are given

over to wheat, barley, oats, hay, and a little corn for silage. The mention of corn caused Edgar to smile because he had a little experience with corn this summer in his club work. Apparently, he had decided that it was taking too many acres to fill their 10 by 30 silo, so he set out to remedy the situation.

"Oregon, you know, is not primarily a corn State," he said, "but I felt that we could improve our silage yields. I first got some good seed—a yellow dent that matured well in our locality and at the same time gave a better growth than our own variety. We prepared a good seedbed and drilled in the usual eight acres for the silo. This fall we were surprised when it took only about half the piece to fill the silo. We had the remainder to feed green to the dairy herd during the fall drought."

Then the modesty of the national champion again asserted itself. "Of course we had an awfully good season so I guess the weather deserves most of the credit."

Since winning the Moses trophy a year ago, Edgar has more than doubled his club accomplishments. His record a year ago listed the completion of 31 projects, 178 exhibits at fairs, prizes in cash and merchandise amounting to $2,722. He had served as leader of eight clubs with every one of the 64 members completing their work 100 per cent. His eight years of club work had resulted in the accumulation of $2,000 worth of purebred animals.

In a single year since winning the title of national club champion, he has completed 16 more club projects, made 197 exhibits and won prizes amounting to $1,500. He has been local leader for 14 clubs in his county with 116 boys and girls enrolled. The valuation of his own livestock has increased from $2,000 to $4,000. His winnings at the county fairs, state fair, and the Pacific International will more than pay his first year at college. Is it any wonder he was too busy to attend school?

But now he is wearing the little green cap—just one of the much-abused freshmen among the big student body on the Oregon State college campus.

Time to Budget

(*From page* 14)

upon a particular set of prices within the range of probability. That is, the expenses, receipts, and net returns that will probably result from a given combination of crops and livestock with different prices may be worked out.

"Two kinds of price changes are of particular significance to farmers. First, there are price trends or long-time upward or downward movements of prices. These long-time upward and downward movements are usually different for different products. For example, in South Dakota for the five-year period, 1921 to 1925, corn increased in price over the five-year period from 1911 to 1915, 8 per cent; wheat increased 20 per cent; potatoes 18 per cent; hogs 18 per cent; and beef cattle 5 per cent; whereas the price of barley decreased 20 per cent and that of oats decreased 14 per cent. Similar changes in price are continually taking place in most farming sections both for products sold and for expense items.

"Other price changes of interest to farmers are price cycles. The prices of many farm products tend to move upward for a period of years and then downward for a more or less similar length of time. For example, hog prices usually tend upward from 1½ to 2½ years and then downward for about the same length of time. For

most other species of livestock the upward and downward movements are for longer periods. There appears to be a tendency for beef-cattle prices to go up from six to nine years and then down for a somewhat similar length of time. In the case of horses the upward and downward price movements tend to extend over periods of 10 to 15 years. The most important factor in determining the length of these upward and downward movements is the length of time required to expand or contract materially any particular enterprise after unusually high or unusually low prices are reached.

"In addition to price trends and cycles, the farmers should realize that the amounts of crops and livestock held over from one year to the next vary and have an influence on the prices of the following year, and that the amounts of different products that will be taken at given prices vary with industrial activity and related factors. As a result of these and other factors, farmers are continually facing new price situations."

After the budget is ready an inventory is taken: the expenses and receipts are kept during the year in the course of keeping farm accounts; and at the end of the year the returns actually obtained are compared with those contemplated in the budget. If a budget has been made for a period of years, it may also be included in the comparisons.

Based on Inventory

Budget-making months in most parts of the country are December, January, February, and March, for then farmers usually have time to think, devise plans, and meet with their advisors. After the crops are harvested, the farmers can take stock, review the results of the past season, and compare the results actually obtained with those expected when the budgets were made. Then they are ready to make budgets for the coming year.

"Safer conclusions will be reached and larger profits will result from the farming operations if the facts considered are thus carefully organized and if judgments are completely formed and recorded and if the comparisons between enterprises and systems are carefully worked out," reminds Mr. Hutson, and he also points out that it is not to be expected that results actually obtained will coincide exactly with budget estimates. "Close approximation will exist only when the price requirements and yields used in making the budget are close to those that actually prevail throughout the production and marketing season. But as the farmer is obliged to take probable future developments into consideration in making his plans, whether he wishes to or not, it is certainly better for him to do it with the best information available than to rely on guesswork."

"The budget enables a farmer to establish a good balance among his field-crop and livestock operations; to know in advance how much seed, fertilizer, and other supplies he will probably want; to forecast the feed requirements of his livestock; to estimate the amount of cash he should keep on hand for farm operations; and to adjust his living expenses, payments, or investments to his probable net returns. Familiarity with the results of the past is a great aid, but the results of the past should be interpreted in the light of conditions expected in the future."

This is what is attempted in making farm budgets. Sample budgets, sample forms for making budgets, detailed instructions for making them, and lists of sources of price and production information, have now been made available in bulletin form to farmers and their leaders. The method of procedure to be followed in making a budget will vary with the system of farming being considered, but the means are now at hand for those who wish to use them.

Cooperative Consciousness

(*From page* 44)

ever made to meet this situation that the Alberta Pool announced in 1928 that it would pay its members a bonus on every bushel of wheat they would store on their farms. A premium of one cent a bushel on all wheat farm-stored until December 15, and a further one cent on all stored until January is this year being paid in this endeavor to create a more orderly distribution of the wheat load during the fall and winter months. It used to be that the farmer who was late in getting threshed and getting his grain to the elevator suffered for his tardiness through the lower returns that came as soon as the elevators were filled. Now the pool member makes capital of this one-time loss.

Other Achievements

Pooling farmers take pride in two other achievements which have been credited to their organization. One is the development of the western trade route through the Vancouver port. The western ports were on the verge of stagnation because the bulk of farm produce was being each year crowded through the narrow channels of the Great Lakes in the annual race to the seaboard. The grain trade through the Lakes was well established and hard to alter. The older companies found it to their advantage to use their already developed eastern route rather than build up a new one in the west. The pools had no such magnet to draw them eastward. Their problem was to find the most economical means of maintaining a steady flow of wheat to the world markets. Their efforts seem to have led to a revival of trade on the Canadian west coast that has all the earmarks of permanence.

The second achievement referred to is one that forms a bone of contention, but is one that is worth mentioning, if only because it has brought out diverging opinions. The fact remains that since the inception of the pools, Winnipeg grain futures have maintained an above-par relation to the Chicago quotations, a thing unusual before this endeavor of the growers became a reality. There is considerable discussion about this point even today, with market men delving into the comparative grades of the two points and digging deep into old market lists in the endeavor to find the "raison d'etre"; to the lay mind, though, it still appears that the pool claim has more than a little justification.

Another word remains to be said on achievement. These pools are dedicated to the job of marketing the prairie wheat more efficiently than had been done in the past. There is no way of proving mathematically that this has been done, but the figures of marketing costs for the three agencies seem to indicate that they are, at least, keeping their goal in mind. Last year it cost the Central Selling Agency 2¾ cents a bushel to market the crop. To this had to be added, in Alberta, nine-twentieths (9/20) of a cent per bushel (the cost of Alberta Pool operation); in Saskatchewan, one-half cent a bushel, and in Manitoba, one cent per bushel.

The Psychological Effect

These are the high lights of Pool endeavor from the business point of view. The second phase, we mentioned earlier, was in the effect the effort had on western agriculture. Those who talk with the majority of pool members must admit there has been a decided and beneficial effect on the outlook of farmers in general. A

sort of class pride, based on rather evident achievement in working together, has developed, and, in developing, has brightened the outlook on life of rural Canada. Canadian agriculture in 1923 was in the depths of despair. This new farmer enterprise has been a real type of farm relief, applied by agriculture itself, and invigorating the whole structure of the farm industry. Even non-pool producers, by the scores, will tell you the pools have been an indirect benefit even to them. Cooperation has destroyed any roots of an inferiority complex that may have been coming to life in the western farming areas. Farmers are "finding" themselves in their efforts to compete with other forms of business.

It would be foolish to say that the cooperative movement was "the" cause of the come-back of Western Canada's wheat area, because other forces have done their share. The pools, though, were the tonic force that was needed to instill into producers that confidence that was necessary for the rehabilitation of the wheat belt.

In 1924 the pools handled 81 million bushels of wheat; in 1927 they marketed 215 million bushels. This is really only forceful evidence of strength when we add that the men who started as pool members at the start are, in the main, still pool enthusiasts. They are coming back now to sign up for the second series of pool contract. It is safe to assert that there will be few desertions from pool ranks when the new contracts are all in. The members have become conscious of the power of cooperative effort and there is little tendency to drift away from the organization.

Getting Stretch

(*From page 9*)

Weights were not taken in 1928 but observations showed some gain for the two plots getting the potash. In August 1928 the top-dressing treatments were repeated, but the potash on plot 1 was increased to 400 pounds per acre. Records of yields were taken on June 5 and on August 13, 1929, with the following results:

Plot	*Fertilizer*	*Tons Hay Per Acre*
1	Potash	3.95
2	Phosphorus	2.58
3	Phos.-Potash	2.82
4	Unfertilized	2.25

The yeields show that potash was the limiting factor on this alfalfa. The yields, however, do not give the credit they should to the different treatments. The plot having potash alone was practically straight alfalfa; the plot with the combination was largely alfalfa; while the check and the phosphorus plots had a large percentage of grasses. These two plots also were covered with plants which showed the potash starvation on the leaves while the potash plots showed none of this trouble. At the end of the season the potash plot had practically a 100 per cent stand while the other plots had stands which were uneven, yellowish, thin, and lacking in vigor.

This work does not mean that alfalfa does not need phosphorus. It merely shows that the results obtained at the Storrs, Connecticut, Experiment Station, where they found that on land which previously had been liberally supplied with superphosphate, potash was the plant food which would increase yields and prolong the life of the alfalfa and is applicable to conditions found on the dairy farms in the State.

Georgia

(*From page* 12)

A new field of research being started is in by-products. Dehydrating peaches, preventing rancidity in pecans, utilizing pimiento pepper waste as poultry feed and as a source of vegetable coloring matter are important phases of this work.

One of the great problems of pork production of the South is soft pork. For several years this station has been working on the problem and has accurate information as to what kinds of feed soften the pork and lard and the hardening feeds which must be used to offset the softening feed.

An interesting development of this project occurred the past year. Tests were made of hard and soft lard in making biscuits and pastries. The taste test made with a large number of people who did not know in which samples soft lard was used resulted in a large majority in favor of biscuits and pastries containing the soft lard.

Three years ago infectious abortion was prevalent in the herd at this station. Now there is no appearance of it and there has been no sign of it for two years. Proper sanitation, quarantine, and tests with the agglutination method brought this about and demonstrated that this serious trouble can be easily and simply controlled.

Georgia needs good permanent pastures as a first requisite to a large livestock development. Some work has been done by the Georgia Station in cooperation with the agricultural department of the Central of Georgia railroad that indicates that combinations of carpet grass, lespedeza, and dallis grass bring returns of $12 to $19 per acre. This station is active in an attempt to organize a South-wide cooperative series of experiments for testing southern pasture grasses.

With the new building, increased funds, and many interesting research problems to attack, the Georgia Experiment Station appears to have reached the greatest period of usefulness in its history.

Alfalfa and Sand

(*From page* 8)

In July, 1929, at the time of the first cutting of the alfalfa, these North Plots were cut separately and the yields weighed. The table on page eight gives the results in terms of dry hay per acre:

These results were so outstanding in showing the potash deficiency of our sandy soil that this last spring, the spring of 1929, we laid out some more plots at the south end of the farm to be seeded to alfalfa, the purpose being to determine what amounts of straight muriate of potash produced most economically the largest tonnage of hay. The application of potash ranged from 100 to 400 pounds per acre.

The alfalfa was seeded with oats and after the oats had been cut and although the farm was at grip with the worst drought since 1894, the stand of alfalfa was unshaken. Even in the stubble it was easy to see that any amount of potash produced greener and more vigorous plants than on the check plots which received no potash.

Next year's cutting should begin to tell the story, but we expect to leave the plots for four years, taking and recording the yields by years. We hope in the end to be able to add something more to the all too meagre knowledge of growing alfalfa on sandy soil, and to be of assistance to others interested in the management of sandy soils.

Defenders Wanted

(*From page 4*)

signed to assist young persons to think with propriety. Of course, I know that Horace told young farmers to go west and grow up with the country, and Murray hung more moss on the motto, "Virtue is Its Own Reward." I am at a loss to decide which type of adviser is more culpable. Greeley probably never did a lick of hard farming in his life. Lindley Murray must of course have been youthful at one time in his dusty career, but it is awfully hard to realize it.

After due cogitating on this knotty point at issue, I come out of a coma to declare that experience alone does not fit a person to advise youth or agriculture. Although Greeley advised minus much real farm experience, I can find plenty of soil-bred folks whose stuff is equally counterfeit. Likewise, a fellow must retain something besides his birth-mark and a diploma in order to keep in trim for advising the youngsters. At any rate, we all agree that free advice is something that youth and agriculture "have had nothing else but."

Now I arrive at plank No. 3, which is full of slivers, although fitting nicely into my parallel picture. Slander and assault are the charges I prefer to make at this juncture. Come with me into a Pullman smoking compartment, or stop a moment in some club room or hotel lobby. The theme opens in the usual way. Somebody mentions the high cost of living. Nobody names expensive dinners, deferred payments, or de luxe trains, but they shift their chatter to the producer's end and dismiss it with a shrug or a sneer.

The pedler with the diamonds remarks that farmers are all inefficient grouches and will never learn to organize "like big biz." The real estate man whose reclamation land boom busted takes an equally purplish viewpoint and says the cards are all stacked against agriculture, and that there is no chance for renters or young beginners to make a grub-stake or get out of debt behind the plow.

The complacent banker purses his lips and gestures hopelessly with his twenty-five-cent perfecto, murmuring about foreclosures and citing chattels. The case is soon over and a verdict returned without bringing in the poor "accused."

Bring on your corporation farming! There's no comfort here for the rural philosopher nor anybody desirous of defending the truth,—not even a stray economist, nor his more discerning brother, the sociologist.

And again, many a farmers' convention has given rise to the trumpetings of a few extremists whose loud bellows and fractious miens have awed their milder brethren to silence and captured the saffron-hued open spaces in the gullible press.

Meanwhile the calloused chaps who were making a middling success of mowing and milking stayed at home and saved words and expenses.

Defense, praise, and hope have been too long taboo in respect to agriculture. It's just the same way toward youth, and you know it!

Only last month somebody told me that a party of ribald collegians chartered a car to travel in Babylonian style to a certain football game. "Oh, that's only a common thing" is the cry dolorous; and the refrain ends with references to hip flasks and a mirth-mad race to delirious disaster.

But did you ever stop to think that there are a thousand times as many robins and bluebirds busy singing and nest building as there are buzzards and carrion crows fluttering around a feast of filth?

And so it goes on forever! Youth and agriculture bear the blame and suffer the slight while only an occasional hopeful soul attempts to marshal facts to their justice and support.

We've had polemics and panegyrics,

platitudes and persiflage, all kinds of stuffed reality and buncombe sincerity—making a miserable picture of farming and a nasty vision of youth. We have sat under it in church and slept under it in college, and the journals of the fourth estate have gotten a hot-box in their super-heated whirling around the ancient story. We have had tiresome reports and bothersome committee resolutions, all keen for scandal and sob stuff, until I hate to enter a farm school or open an agricultural paper, for fear some ghoul will shake a rheumy spectre of farm dissolution in my face. The next similarity between youth and agriculture is quite the reverse of disparagement, but akin to sophistry. Exploitation has run rampant with all classes of people and special privilege that desired to utilize the latent power and sympathy of agriculture and youth.

Beginning with the homestead laws and taking in all the relief acts and loan systems that have been passed or postponed by state and federal governments, we cannot escape the fact that the desire for mass votes to perpetuate a party's power had more weight than statecraft in the outcome. I am not forgetting the earnest rural spokesmen who set fire to the prairies and awakened the bucolic consciousness. Yet practical politics served its own ends withal, and no class of society has received more electoral time attention than farmers. If a bright farm leader hatched out an idea, the professional office seekers began counting chickens right away.

In spite of oft repeated lamentations about its woeful public neglect, agriculture in reality has received more "succor" by statute than any class except bankers. The farmers had the votes and the bankers had the dollars.

Now regard the plight of youth. Its schools have been invaded by all manner of cranks and wire pullers. Enough pestiferous essay contests and Demosthenian demonstrations have been foisted on our patient pedagogues to make them sick of their jobs. Youthful prodigies have been carted all over this broad land to appear before the footlights to fatten somebody's bank account. Even the Sunday school and dear old Santa Claus, the orphans' plight and the empty stocking have opened streams of crocodile tears and pried shekels from the most hard boiled bachelors.

Now out of this murk of alternating praise and persecution that youth and agriculture have undergone, wise observers find one grim truth staring them stolidly in the face.

Just one simple and poignant statement tells the story, namely: that it is harder to be a good youth and a good farmer under such inherited and acquired conditions.

WHEN most of the speaking and writing world insists that youth must study Freud rather than the Bible and hastens to place pitfalls and allurements on every hand, maybe we ought to credit the American Boy of 1930 with as much sanity and resistance as Abraham Lincoln and his borrowed speller. When every magazine rack flaunts sex and crime and when we make it cute and fashionable to outwit courts and cops, then perhaps a youngster who persists in being a clean citizen deserves honor for running the gauntlet unscathed.

When land values soar and farm equipment and upkeep costs put a higher earning tax upon our acreage, then there is no room for the coward or the ill-prepared operator. Certainly it is harder to be a good farmer on old-time standards. Furthermore, when farmers themselves in convention assembled repeat the alarms and forebodings and weep about the dearth of young folks at home and the advancing age of their horses, it surely makes tough sledding for starters in the game who want a chunk of extended credit.

If farm folks and their friends were

as zealous of public opinion and confidence as bankers and brokers, then things would be much simpler and easier for agricultural progress. Nobody wants to pet a dog that has been abused to the point of mange and blisters.

Looking at it in a material way, both youth and agriculture have indeed enjoyed better education and handier equipment in these modern times than the kids and rubes realized in the past.

We have also provided them with chances to organize. Precious little good that does if the rest of the world is not equally organized—not to resist them—but to assist them.

So often when farmers organize, an outsider steps in and upsets the dope with private ideas of reform. Or some watchful and jealous privileged class steals the brake from their band wagon while the music plays cooperative anthems. Many a youthful society or movement has been wrecked by some doddering old-timer.

Positive good cheer and helpful hope are two of the things needed by youth and agriculture just now. Negative minds won't mend the situation. We must have more of the "do" and less of the "don't." We need more leaders and sympathizers who shout "Come on" instead of "Get along there!"

Sympathy, example, and optimism! I name the three vials we should have in our medicine chest would we presume to doctor the ailments of youth or agriculture. I do not include money lending or free advice, and I believe that organization should come from within.

I need not touch greatly on the first for it is self-evident. Its danger zone lies on the border line of paternalism, and where is there a lusty youth or a husky farmer who will not damn paternalism with his last breath? Sympathy does not mean patronizing, and this is where some of the service clubs and boy-helping brigades have taken a tumble

Good memories ought to help all of us to sympathize with youth, but of course not all of us can visualize former days in field and furrow. Yet the bulk of us had grandsires that busted the sod.

Example, precept, or whatever you choose to call it, comes next. Good youth do not always copy honest parents, but firm, sane, and cheerful parental care cheats the bootlegger nine times out of ten.

Business houses that are neat, orderly, well-accounted, and up-to-date cannot help throwing a vast influence outward into the surrounding countryside. Towns that have hospitals, good churches, modern paving, and excellent service are almost without exception found catering to a discriminating group of farmers. A village that goes to seed will not make a "volunteer crop" of its adjacent ruralities.

OPTIMISM comes last. It is worn thin with overwork in the dictionary, like cooperation. I dare not describe or prescribe methods of its application to boys and farmers. Yet it is powerful and potent, and I have just returned from a joint congress of youth and agriculture in Chicago where its mystic spell charged everything with life and animation.

Facing the New Year with all the glorious things brought to us by the Four Leaf Clover emblem and its mighty army of members and leaders, and doubly clinched and riveted by the Smith-Hughes movement in education, who can relinquish optimism at this pregnant hour?

This means that the rising generation will be more of a blessing to youth and a godsend to agriculture than any who have traveled this way during the life of our nation.

Be a defender, but don't be on the defensive! You won't have to if you take the motto of youth and agriculture—"Make the Best Better."

A TWISTER

A city visitor, from one of the windswept states, gazed intently at the spiral fire escape that wound its way down the rear of a thirty-story building.

"Gosh," he exclaimed. "That must have been a danged long ladder before the cyclone hit it."

Customer: "Are those eggs strictly fresh?"

Grocer (to boy helper): "George, are those eggs cool enough to sell yet?"

Boss—"Ye're late this morning, Rastus!"

Rastus—"Well, sah, when Ah looked in de glass dis mornin' Ah couldn't see meself there, so Ah thought Ah'd gone to work. It was only some time afterwards dat Ah discovered dat de glass had dropping out ob de frame!"

"Did the children behave when you bathed them?" asked the mistress of the new French nurse.

"All but ze biggest boy—and, mirableu!—how he fight and kick an nearly tear ze face off me before I could get him in."

"Which biggest boy—we've only one boy, and he's only two years old?"

"Eet is no him at all, I mean. 'Tis a boy who wears glasses and has ze curly hair."

"Boy! Boy! That's not a boy! That's my husband!"—*The Ink Spot.*

WHOSE?

An old farmer and his wife were driving along a country road through hilly country; the team, when they would come to a hill, would settle into the collar and pull at a steady stride.

The farmer's wife spoke to her husband and said, "Hiram, I have just been thinking, watching this team settle in the collar and pull steadily along, how wonderful it would be if we could go along through life that way."

"Maria," he said, "Possibly we could, if we were like this team with only one tongue between us."

A southern woman stopped a darkey on the street the other day and said: "Mose, I'm sorry to hear your wife got a divorce and has left you."

Mose: "Yessum, she's done gone back to Alabama."

Southern Woman: "Who's going to do my washing now?"

Mose: "Don't yo' fret, missus, I's co'ting again, an' Ah sho co'ts fast."
—*Montgomery Times.*

WAITING

The man was playing alone. Two boys kept following him around the course. At the ninth hole, he turned to the boys and said: "You'll never learn to play watching me."

"We're not watching you," said one of the boys. "We're going fishing as soon as you dig up some more worms."—*Tackle.*

4-4-20

for

Sweet Potatoes

. . . . . a fertilizer recommendation based on nine years of experiment

A 4-4-20 (NPK) fertilizer at 750 pounds per acre for Big Stem sweet potatoes on sandy soils of average fertility . . . is the recommendation of the Virginia Truck Experiment Station. This is based on nine years of continuous experiments in which 13 different combinations of nitrogen, phosphoric acid, and potash were compared.

As the potash in the fertilizer was increased in these tests an increased average yield of prime sweet potatoes resulted: 3% potash yielded 210 bushels; 6% yielded 242 bushels; 9%—253 bushels; 12%—276 bushels; while 15% potash yielded 289 bushels.

The Station recommends 1,000 pounds of 3-3-15 fertilizer per acre, or its equivalent—750 pounds of 4-4-20. A higher percentage of ammonia may prove beneficial on soils with a very low nitrogen content. Make sure that your sweet potato fertilizer contains plenty of potash. POTASH PAYS!

If you are interested in producing bigger yields of better sweet potatoes, write the Virginia Truck Experiment Station, Norfolk, Va., requesting a copy of Bulletin 66 which describes in detail the Station's experiments with this crop.

Agricultural and Scientific Bureau

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